AN ASSESSMENT OF THE WORK ABILITY, DISABILITY AND QUALITY OF LIFE OF WORKING PEOPLE OF PRE-RETIREMENT AND RETIREMENT AGE IN POLAND – A CROSS-SECTIONAL PILOT STUDY

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Abstract
Objectives: The aim of this work was to assess the work ability, health status, disability and quality of life of working people of pre-retirement and retirement age, as well as to analyze factors affecting the ability to perform work in older age. **Material and Methods:** A cross-sectional pilot study was conducted in the Podkarpackie and Świętokrzyskie voivodeships, Poland, in randomly selected workplaces of intellectual nature. It was carried out by means of direct interviews in the workplace of the surveyed people, using the *Work Ability Index*, a questionnaire based on the *WHO Disability Assessment Schedule* 2.0, the *WHO Quality of Life-BREF* questionnaire, the *Geriatric Depression Scale*, and the *Visual Analogue Scale* (VAS). The criteria for inclusion were: age 55–75 years and informed consent to participate in the study. Overall, 201 complete questionnaires were included in the analysis. Demographic data is presented using descriptive statistics measurements. The logistic regression model was used to identify factors related to work ability. **Results:** The vast majority (69.66%) of employees performing intellectual work had moderate or poor work ability. The average level of general disability in the studied group was mild (20.65), and the quality of life was quite good (64.73). A significant problem among the surveyed people was a quite high average level of pain (VAS = 3.99), the occurrence of depression (73.63%), as well as musculoskeletal (64.18%) and cardiovascular diseases (52.24%). The most important factor contributing to a better work ability was the adaptation of the workplace to functional and health-related needs (OR = 7.79). Psychological well-being (OR = 1.12), cognitive performance (OR = 0.97) and a smaller number of chronic diseases (OR = 0.58) were also important factors. **Conclusions:** Preparation of elderly people for professional activity should be conducted in 2 different ways, i.e., by means of education and implementation of an active, healthy lifestyle, and increasing control over one's own health and factors determining it, as well as by the proper organization of working space, and quick access to treatment and rehabilitation, especially in the case of musculoskeletal and cardiovascular diseases. Int J Occup Med Environ Health. 2021;34(1):69–85

Key words:
quality of life, disability, *Work Ability Index*, work ability, older workers, pre-retirement and retirement age

INTRODUCTION

The demographic aging of the population in Europe, and in many highly developed countries in the world, is generally a global process. What is more, forecasts indicate that this trend may intensify over the next decades, leading to significant differences in the proportions between older and younger people [1]. It is worth mentioning that the aging process has some negative economic effects due to the fact that the health and retirement benefits incur large public expenses. The number of people collecting the aforementioned benefits is rising, while the working age population is decreasing [2]. This may reduce the rate of economic growth and weaken the possibility of financing benefits by the state, which will increase the level of redistribution of funds from people of working age, as well as limit the transfer of funds to elderly people, thus reducing their quality of life and contributing to other health and living problems [3].

In June 2018, the Polish population amounted 38 413 000 residents, including 6 619 000 people aged ≥65 years, which corresponds to 17.2% of the total population. The results of alterations in the demographic processes include the changing number and structure of the population by age. Until 2015, there was a clear decrease in the number and percentage of children (aged 0–14 years), and a steady increase in the group of elderly people (≥65 years) was observed by researchers [4]. As a result of changes in the demographic structure, the World Health Organization (WHO) introduced the concept of active aging in the late 1990s. According to WHO, active aging is "the process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age" [5].

Due to the progressing aging of the population, specialists working in health care meet more elderly people with comorbidities and complex disabilities in their professional practice. Aging and diseases specific to older age lead to more or less visible disabilities. It often happens that aging is complicated or accelerated by chronic diseases.

Moreover, human activity gradually decreases with age, which is also associated with the aging process, as well as with the health status and living conditions. As a result of these changes, the living standards of elderly people decline which, in the case of an unfavorable course of aging, may lead to the loss of the capacity to live independently [6]. Therefore, proper prophylactic treatment in earlier stages of life and the adequate health care have a major impact on maintaining physical fitness and improving the health status of an elderly person. Progress in the field of medicine and the improving living conditions improve the health condition and fitness of elderly people [2].

It is estimated that in the coming decades the Polish population will be getting older [3]. Professional activity affects mental health and well-being, reduces depression and stress, and also gives a sense of satisfaction [7]. It is worth striving to achieve the highest employment rates and to retain elderly people as long as possible on the labor market. The EU activities in the field of social policy are based on the struggle with the adverse consequences of the aging process among the EU population. There is a tendency to move away from the welfare state in order to develop the concept of active employment. The surge in the welfare in the EU countries should engage actions against the exclusion of the elderly due to lack of livelihood, limited access to medical care, as well as a lack of satisfaction regarding their functioning in society [2].

Owing to the aging society, it is important to encourage elderly people to remain on the labor market longer. Evidence that a longer period of professional activity reduces the level of disability for elderly people is definitely worth mentioning [8,9]. On the one hand, people who experience disability at pre-retirement age adapt to it faster and cope with it better than people aged ≥65 years [10]. On the other hand, poor health is a common reason for people aged 55–64 to retire early [11]. Speaking of people of retirement age, i.e., ≥65 years of age, living with disability is more common than in people aged >51 years,

and it more often concerns physical limitations than activities connected with everyday life. In addition to physical disability, mental disability is a common problem. Mental disorders may cause occupational disability, and thus may become a factor influencing a decision to retire [12]. People who decide to continue working at retirement age must take their health into consideration. At the same time, employers should adapt working conditions to the needs and capabilities of older workers [9].

In Poland, there is a higher professional activity of older men than women, which is caused by the retirement age difference determined by the applicable act [13]. Working people who can retire often delay this decision because of higher earnings at work compared to social benefits. The economic and financial factor is currently the main reason for extending the period of professional activity. Some people aged >55 years are very content with their professional work, which brings them satisfaction and makes them abandon the idea of retirement. One of the factors affecting staying at work is the possibility of self-fulfillment, because further work allows an individual to meet his/her social needs; it also expands the possibility of development and allows one to remain in a good mental and physical condition. In addition, the opportunity to continue working can significantly affect the quality of life of elderly people.

In connection with the demographic and economic situation, it is necessary to develop research in the area related to the possibilities of extending the employment period of elderly people in a way that is beneficial to each of the interested parties, in particular focusing on the study of the relationship between the physical and mental status of older workers, and the conditions created in the work environment.

The aim of this research was to assess the work ability, health status, including disability, and quality of life of working people of pre-retirement and retirement age, as well as to analyze factors affecting the ability to perform work in older age.

MATERIAL AND METHODS

It was a cross-sectional pilot study. The research was conducted in the Podkarpackie and Świętokrzyskie voivodeships, Poland, in November 2018–March 2019, in 8 randomly selected workplaces of intellectual nature. A multistage cluster sampling method was used, selecting 2 districts in each voivodeship, and then 2 workplaces in each of them. After obtaining a permission to conduct the study, the company entered the main pool, but in the case of no consent, companies were sampled until the assumed number of workplaces in the voivodeship was obtained. An invitation (with the consent of the managerial staff of individual workplaces) to participate in the study was directed to all employees aged 55–75 years, i.e., those being of pre-retirement and retirement age. The study was performed using a direct pen-and-paper interview method in the workplace of the surveyed people. The criteria for the inclusion in the study were: age 55–75 years, and voluntary and informed consent of the respondent to participate in the study. The exclusion criteria were: age <55 years and >75 years, and no consent to participate in the study. In general, 206 people took part in the study. Finally, 201 complete questionnaires were included in the analysis (Figure 1).

The following research tools were used for the study:

1. The *Work Ability Index* (WAI) by means of which the respondents' work ability was assessed. More specifically, WAI is composed of 7 items, whereby items 2, 3 and 7 consist of 2, 14 and 3 sub-items, respectively. Each element has a different result, and a higher score means a better work ability, including (items, scoring ranges) the current work ability compared to the best-in-life work ability (item 1, 0–10, individual sub-items with a weight of 0.5 or 1.5, depending on the type of work), in relation to work requirements (item 2, 2–10), the number of current groups of diseases diagnosed by a doctor (item 3, 1–7), estimated work disability due to diseases (item 4, 1–6), sick leaves
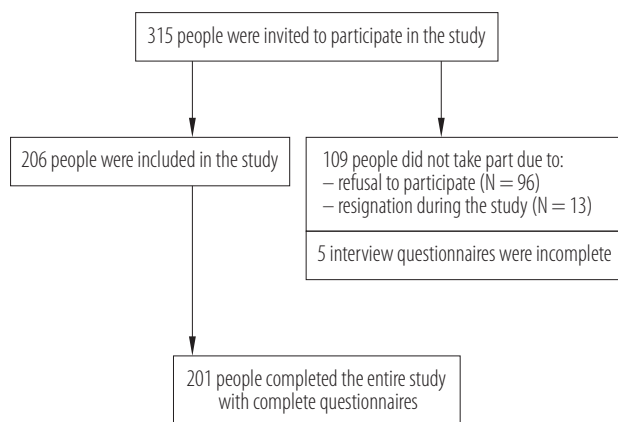
Figure 1. Flow diagram of the study on the work ability, health status, disability and quality of life of working people of pre-retirement and retirement age, performed in the Podkarpackie and Świętokrzyskie voivodeships, Poland, in November 2018–March 2019

taken during the previous year (item 5, 1–5), personal predictions for work capacity in 2 years from now (item 6, 1, 4 or 7) and mental resources related to employees' lives in general, both at work and in free time (item 7, 1–4). The numbers in brackets for each item indicate the scoring range. The total WAI score is calculated by adding up the scores of all items, ranging 7–49. The total WAI scores are divided into 4 categories: poor (7–27), moderate (28–36), good (37–43) and excellent (44–49). The WAI scores were calculated according to the standard method given by the Finnish Institute of Occupational Health [14].

2. The questionnaire based on the *WHO Disability Assessment Schedule* 2.0 (WHODAS 2.0) developed by WHO and used to assess disability. It is based on the conceptual framework of the International Classification of Functioning, Disability and Health (ICF). The questionnaire contains 36 questions assigned to the following 6 domains: Cognition (Do1), Mobility (Do2), Self-care (Do3), Getting along (Do4), Life activities – domestic responsibilities (Do5.1), Life activities – work (Do5.2), and Participation (Do6).

Each question is rated on a 5-pt scale, where 1 – no, 2 – mild, 3 – moderate, 4 – severe, and 5 – extreme difficulties. According to the instruction manual, multi-sectional items were coded and the original score was converted to a scale of 0–100, in which higher scores indicated more limitations (0 – no difficulty, 100 – a very high degree of difficulty). Finally, in order to determine the overall level of disability and disability in specific domains of WHODAS 2.0, the following ICF-compatible scale was used: no disability (0–4%), mild disability (5–24%), moderate disability (25–49%), severe disability (50–95%), and extreme disability (96–100%) [15].

3. The *WHO Quality of Life-BREF* (WHOQOL-BREF) questionnaire developed by WHO and used to assess the quality of life. This instrument contains 26 questions assigned to 4 domains assessing the quality of life related to physical and psychological health, social relations, and the environment. Each question is rated on a 5-pt scale. The results were compiled in accordance with WHO guidelines and transformed to a scale of 0–100, where 0 – the worst quality of life, and 100 – the best quality of life [16].

4. The *Geriatric Depression Scale* (GDS) by which the emotional state and the occurrence of depressive moods in the respondents were assessed. The GDS contains 30 short questions with 2 options to choose from (yes/no). The respondents receive 0 or 1 pt for each answer according to the instructions. The final result is the sum of the points categorized on a scale of 0–30 pts, where 0–10 pts – no depression, 11–20 pts – mild depression, and 21–30 pts – deep depression [17].

5. The *Visual Analogue Scale* (VAS) by which the level of pain intensity was assessed. More specifically, VAS is presented as a line of 0–10, where 0 is attributed to the total absence of pain, and 10 to the most severe pain imaginable.

Basic socio-demographic information on the respondents' physical activity and health was also collected.

Statistical methods

The data was analyzed using the Statistica TIBCO Software Inc. program (2017), Statistica, version 13. Demographic data is presented using descriptive statistics measurements. The logistic regression model was used to identify factors related to work ability. The level of significance was set at $p < 0.05$. The χ^2 test (in the case of qualitative variables) and the Mann-Whitney U test (in the case of quantitative variables) were used for the initial analysis of the relationship between individual demographic, health and functions variables, as well as ability to work. The normal distribution of the quantitative variables was verified using the Shapiro-Wilk test. Logistic regression models were used to identify sets of factors having a statistically significant effect on the occurrence of at least a good work ability (WAI) in the entire study group. Model parameters were estimated by means of a stepwise regression, forward selection method. The quality of the model estimation was tested using the Hosmer-Lemeshow test and pseudo R^2 values.

Ethics

According to the Helsinki Declaration, the respondents were informed about the purpose and course of the study, and they gave their informed consent to participate in it. The study design was approved by the Bioethics Committee of the University of Rzeszow (Bioethics Committee's decision No. 2018/06/22a).

RESULTS

Characteristics of the studied population

Complete interview questionnaires of 201 people were included in the analysis, comprising 133 people (66.17%) of pre-retirement age and 68 people (33.83%) of retirement age. In the entire study population, the average age was 61.0 years (SD = 4.2). The average age in the pre-retirement age group was 59.4 years (SD = 2.8), while in the retirement age group it was 64.2 years (SD = 4.5).

The study involved 121 women (60.20%), including 91 of pre-retirement age (68.42%) and 30 of retirement age (44.12%). What is more, the study incorporated 80 men (39.80%), including 42 of pre-retirement age (31.58%) and 38 of retirement age (55.88%). Most of the respondents lived in the countryside (52.74%), were in a relationship (72.14%), and had higher education (41.79%). Speaking of the retirement age group, the number of single people increased significantly (p = 0.003).

Most of the surveyed people worked as regular/office workers (59.70%) and were employed under a contract of employment (84.58%), with full-time employment (80.60%). With reference to the people of retirement age, there were significantly more employees working as specialists or as members of management staff. In addition, the number of people employed under a contract of full-time employment also decreased significantly. Most of the respondents confirmed the compliance of their work with education at the level of 75–100% (51.13%), and performed tasks in accordance with their qualifications (65.17%). The majority of the respondents performed their duties at the workplace (89.05%), whereas only 10.95% did their work from home, and the number of people working from home increased in the retirement age group (17.65%).

Most of the respondents stated that they had a workplace adapted to their functional needs resulting from their health (73.63%). However, every fourth older employee reported a lack of adjustment of the workplace to their health needs (26.37%). Considering work ability, nearly half of the respondents had a moderate work ability (46.77%). Almost every fourth person had a poor work ability (22.89%), the same as a good work ability (24.88%). Only 11 people had an excellent work ability, and they all were of pre-retirement age. Taking all these aspects into account, there were no statistically significant differences in work ability between the people of pre-retirement and retirement age (Table 1).

Table 1. Socio-demographic characteristics of the study population of employees aged 55–75 years in the Podkarpackie and Świętokrzyskie voivodeships, Poland, in November 2018–March 2019

Variable	Respondents (N = 201)			p
	total	pre-retirement age (N = 133)	retirement age (N = 68)	
Age [years] (M±SD)	61.0±4.2	59.4±2.8	64.2±4.5	<0.001[a]
Sex [n (%)]				0.001[b]
female	121 (60.20)	91 (68.42)	30 (44.12)	
male	80 (39.80)	42 (31.58)	38 (55.88)	
Place of residence [n (%)]				0.355[b]
countryside	106 (52.74)	71 (53.38)	35 (51.47)	
town				
≤100 000 inhabitants	57 (28.36)	34 (25.56)	23 (33.82)	
>100 000 inhabitants	38 (18.91)	28 (21.05)	10 (14.71)	
Marital status [n (%)]				0.003[b]
single	56 (27.86)	28 (21.05)	28 (41.18)	
in a relationship	145 (72.14)	105 (78.95)	40 (58.82)	
Education [n (%)]				0.796[b]
vocational	59 (29.35)	41 (30.83)	18 (26.47)	
secondary	58 (28.86)	37 (27.82)	21 (30.88)	
tertiary	84 (41.79)	55 (41.35)	29 (42.65)	
Work position [n (%)]				0.019[b]
regular/office worker	120 (59.70)	84 (63.16)	36 (52.94)	
skilled/specialist worker	37 (18.41)	24 (18.05)	13 (19.12)	
mid-level employee/executive	32 (15.92)	22 (16.54)	10 (14.71)	
member of management staff/managing director	12 (5.97)	3 (2.26)	9 (13.24)	
Form of employment [n (%)]				<0.001[b]
employment contract	170 (84.58)	121 (90.98)	49 (72.06)	
other forms of employment	31 (15.42)	12 (9.02)	19 (27.94)	
Working time [n (%)]				<0.001[b]
full-time employment or equivalent	162 (80.60)	118 (88.72)	44 (64.71)	
part-time employment	39 (19.40)	15 (11.28)	24 (35.29)	
Compliance of work with qualifications [n (%)]				0.482[b]
75–100%	99 (49.25)	68 (51.13)	31 (45.59)	
50–75%	44 (21.89)	30 (22.56)	14 (20.59)	
25–50%	18 (8.96)	10 (7.52)	8 (11.76)	
1–25%	11 (5.47)	5 (3.76)	6 (8.82)	
no compliance	29 (14.43)	20 (15.04)	9 (13.24)	

Table 1. Socio-demographic characteristics of the study population of employees aged 55–75 years in the Podkarpackie and Świętokrzyskie voivodeships, Poland, in November 2018–March 2019 – cont.

Variable	Respondents (N = 201)			p
	total	pre-retirement age (N = 133)	retirement age (N = 68)	
Tasks below competencies (n [%])				0.750[b]
yes	71 (35.32)	48 (36.09)	23 (33.82)	
no	130 (61.68)	85 (63.91)	45 (66.18)	
Workplace (n [%])				0.075[b]
home	22 (10.95)	10 (7.52)	12 (17.65)	
employing establishment	179 (89.05)	123 (92.48)	56 (82.35)	
Workplace adapted to functional and health-related needs (n [%])				0.753[b]
yes	148 (73.63)	97 (72.93)	51 (75.00)	
no	53 (26.37)	36 (27.07)	17 (25.00)	
Ability for work (WAI) (n [%])				0.090[b]
excellent	11 (5.47)	11 (8.27)	0 (0.00)	
good	50 (24.88)	30 (22.56)	20 (29.41)	
moderate	94 (46.77)	62 (46.62)	32 (47.06)	
poor	46 (22.89)	30 (22.56)	16 (23.53)	

[a] The Mann-Whitney U test.
[b] The χ^2 test.
WAI – *Work Ability Index*.

With regard to the general disability assessment, a mild level was found in the study population. The level of disability in particular domains varied from mild to moderate. Furthermore, there were no statistically significant differences between the people of pre-retirement and retirement age. The highest average disability level was found in Do5.1 Life activities – domestic responsibilities (26.87), Do6 Participation (25.48), and Do1 Cognition (25.22), and that disability was assessed as moderate (Table 2).

The average total quality of life in the study population was quite good (64.73/100 pts). Similarly, the quality of life of >60 pts was reported in particular domains, with the highest average quality of life in Do3 Social relations (66.99/100 pts), and the lowest in Do2 Physical domain (62.58/100 pts). There were no statistically significant differences in the quality of life between the people of pre-retirement and retirement age (Table 2).

Bivariate analysis

The average number of chronic diseases among the surveyed people was high and amounted to 3.87 (SD = 2.74). As for the average number of chronic diseases in the retirement age group, it was significantly higher than in the pre-retirement age group and amounted to 4.26 (SD = 2.61, p = 0.041). The majority of respondents did not smoke (70.65%) and did not consume alcohol (66.67%), with a higher statistically significant difference in the frequency of alcohol consumption among the people of retirement age

Table 2. Disability and quality of life of the study population in the Podkarpackie and Świętokrzyskie voivodeships, Poland, in November 2018–March 2019

Variable	Respondents (N = 201)			p
	total	pre-retirement age (N = 133)	retirement age (N = 68)	
Disability (WHODAS 2.0) (M±SD)				
total	20.65±15.38	21.07±15.73)	19.81±14.75	0.700
Do1 Cognition	25.22±22.22	25.53±22.00	24.63±22.81	0.730
Do2 Mobility	24.94±22.87	25.09±24.44	24.63±19.61	0.654
Do3 Self-care	10.85±18.41	10.08±18.57	12.35±18.13	0.238
Do4 Getting along	21.48±22.04	21.49±21.76	21.45±22.73	0.937
Do5.1 Life activities – domestic responsibilities	26.87±22.49	27.29±22.67	26.03±22.27	0.645
Do5.2 Life activities – work	22.85±20.52	23.74±20.65	21.11±20.29	0.340
Do6 Participation	25.48±20.15	27.13±20.96	22.24±18.18	0.158
Quality of life (WHOQOL-BREF) (M±SD)				
total	64.73±13.55	64.27±13.60	65.63±13.49	0.504
Do1 Psychological	64.57±16.12	64.61±16.85	64.49±14.71	0.985
Do2 Physical	62.58±16.07	62.12±15.83	63.49±16.60	0.692
Do3 Social relationships	66.99±18.77	67.14±18.78	66.68±18.88	0.724
Do4 Environment	64.79±14.01	63.22±14.15	67.85±13.32	0.021

p – the Mann-Whitney U test.
WHODAS 2.0 – *WHO Disability Assessment Schedule* 2.0; WHOQOL-BREF – the *WHO Quality of Life-BREF* questionnaire.

(47.06%, p = 0.003). Most of the respondents did not eat rationally, according to the pyramid of healthy nutrition for seniors (66.67%), and there were no differences in this respect between the analyzed groups. The overwhelming majority of the respondents were not physically active, did not undertake physical activity for ≥150 min/week (80.60%), and did not perform exercises regularly (56.72%). There were no statistically significant differences in the level of physical activity between the people of retirement and pre-retirement age. What is more, most of the respondents did not use mobility aids (81.59%) (Table 3).

Speaking of a pain assessment, its average level reported by the respondents was 3.99, and it did not differ between the groups. Furthermore, by means of the GDS, mild (32.24%) and deep (20.40%) depression was found in most of the surveyed people. This condition was comparable for the people of retirement and pre-retirement age. In addition, considering the prevalence of diseases, musculoskeletal diseases (64.18%) were found in the majority of the surveyed people, but they were significantly more common among those of retirement age (73.53%, p = 0.048). The second most common disease group were cardiovascular diseases (52.24%), and they also occurred significantly more frequently among the older respondents (64.71%, p = 011) (Table 3).

A dependence analysis of the work ability of the surveyed elderly people was performed considering the occurrence of various factors. For this purpose, the respondents were

Table 3. Health status and health behaviors of the study population in the Podkarpackie and Świętokrzyskie voivodeships, Poland, in November 2018–March 2019

Variable	Respondents (N = 201)			p
	total	pre-retirement age (N = 133)	retirement age (N = 68)	
Chronic diseases (M±SD)	3.87±2.74	3.68±2.79	4.26±2.61	0.041[a]
Smoking cigarettes (n [%])				0.990[b]
yes	59 (29.35)	39 (29.32)	20 (29.41)	
no	142 (70.65)	94 (70.68)	48 (70.59)	
Alcohol consumption (n [%])				0.003[b]
yes	67 (33.33)	35 (26.32)	32 (47.06)	
no	134 (66.67)	98 (73.68)	36 (52.94)	
Eating according to the pyramid of healthy nutrition (n [%])				0.942[b]
yes	67 (33.33)	42 (31.58)	25 (36.76)	
no	134 (66.67)	91 (68.42)	43 (63.24)	
Physical activity for ≥150 min/week (n [%])				0.632[b]
yes	39 (19.40)	26 (19.55)	13 (19.12)	
no	162 (80.60)	107 (80.45)	55 (80.88)	
Performing physical exercises (n [%])				0.440[b]
yes	87 (43.28)	55 (41.35)	32 (47.06)	
no	114 (56.72)	78 (58.65)	36 (52.94)	
Using mobility aids (n [%])				0.085[b]
yes	37 (18.41)	20 (15.04)	17 (25.00)	
no	164 (81.59)	113 (84.96)	51 (75.00)	
Pain (VAS) (M±SD)	3.99±2.41	3.99±2.55	3.99±2.13	0.827[a]
Depression (GDS) (n [%])				0.565[b]
no	95 (47.26)	62 (46.62)	33 (48.53)	
mild	65 (32.24)	46 (34.59)	19 (27.94)	
deep	41 (20.40)	25 (18.80)	16 (23.53)	
Injuries after accidents (n [%])				0.204[b]
yes	88 (43.78)	54 (40.60)	34 (50.00)	
no	113 (56.22)	79 (59.40)	34 (50.00)	
Musculoskeletal diseases (n [%])				0.048[b]
yes	129 (64.18)	79 (59.40)	50 (73.53)	
no	72 (35.82)	54 (40.60)	18 (26.47)	
Cardiovascular diseases (n [%])				0.011[b]
yes	105 (52.24)	61 (45.86)	44 (64.71)	
no	96 (47.76)	72 (54.14)	24 (35.29)	

Table 3. Health status and health behaviors of the study population in the Podkarpackie and Świętokrzyskie voivodeships, Poland, in November 2018–March 2019 – cont.

Variable	Respondents (N = 201)			p
	total	pre-retirement age (N = 133)	retirement age (N = 68)	
Respiratory diseases (n [%])				0.981b
yes	53 (26.37)	35 (26.32)	18 (26.47)	
no	148 (73.63)	98 (73.68)	50 (73.53)	
Neurological and sense organ disease (n [%])				0.099b
yes	59 (29.35)	34 (25.56)	25 (36.76)	
no	142 (70.65)	99 (74.44)	43 (63.24)	
Gastrointestinal diseases (n [%])				0.842b
yes	40 (19.90)	27 (20.30)	13 (19.12)	
no	161 (80.10)	106 (79.70)	55 (80.88)	
Genitourinary diseases (n [%])				0.731b
yes	29 (14.43)	20 (15.04)	9 (13.24)	
no	172 (85.57)	113 (84.96)	59 (86.76)	
Endocrine and metabolic diseases (n [%])				0.403b
yes	73 (36.32)	51 (38.35)	22 (32.35)	
no	128 (63.68)	82 (61.65)	46 (67.65)	

[a] The Mann-Whitney U test.
[b] The χ^2 test.
GDS – *Geriatric Depression Scale*; VAS – *Visual Analogue Scale*.

divided into 2 subgroups: the ones with at most a moderate work ability (WAI ≤36) and the ones with at least a good work ability (WAI ≥37). It was found that the following factors affected the lower work ability: a higher level of pain, a greater number of chronic diseases, the use of mobility aids, the workplace not being adapted to the functional and health-related needs of elderly people, the occurrence of depression, and a higher level of general disability and disability in individual domains measured with WHODAS 2.0. A lower work ability was also significantly associated with a lower level of the total quality of life and the quality of life in individual domains measured with WHOQOL-BREF (Table 4).

Multivariate analysis

The logistic regression model included variables that significantly differentiated the surveyed population in terms of their work ability at most at a moderate level and at least at a good level.

The model studying the influence of the factors of at least a good work ability was well matched to the data, as indicated by the results of the Hosmer-Lemeshow test (HL = 4.311, p = 0.828) and the pseudo R^2 value of 0.8559, which indicates that the model correctly classified 85.59% of all the cases.

It was found that the most important factor affecting at least a good work ability was the workplace adapted to

Table 4. Dependence of work ability of the studied population on selected factors in the Podkarpackie and Świętokrzyskie voivodeships, Poland, in November 2018–March 2019

| Selected factor | Respondents' work ability (N = 201) | | p |
	at most moderate (N = 140)	at least good (N = 61)	
Age (n [%])			0.836[b]
pre-retirement	92 (65.71)	41 (67.21)	
retirement	48 (34.29)	20 (32.79)	
Chronic diseases (M±SD)	4.64±2.77	2.11±1.64	<0.001[a]
Smoking cigarettes (n [%])			0.098[b]
yes	46 (32.86)	13 (21.31)	
no	94 (67.14)	48 (78.69)	
Alcohol consumption (n [%])			0.448[b]
yes	49 (35.00)	18 (29.51)	
no	91 (65.00)	43 (70.49)	
Eating according to the pyramid of healthy nutrition (n [%])			0.914[b]
yes	47 (33.57)	20 (32.79)	
no	93 (66.43)	41 (67.21)	
Using mobility aids (n [%])			0.002[b]
yes	32 (22.86)	5 (8.20)	
no	108 (77.14)	56 (91.80)	
Workplace adapted to functional and health-related needs (n [%])			0.002[b]
yes	94 (67.14)	54 (88.52)	
no	46 (32.86)	7 (11.48)	
Physical activity for ≥150 min/week (n [%])			0.220[b]
yes	24 (17.14)	15 (24.59)	
no	116 (82.86)	46 (75.41)	
Performing physical exercises (n [%])			0.083[b]
yes	55 (39.29)	29 (47.54)	
no	85 (60.71)	29 (47.54)	
Pain (VAS) (M±SD)	4.63±2.28	2.54±2.08	<0.001[a]
Depression (GDS) (n [%])			0.005[b]
yes	83 (59.29)	23 (37.70)	
no	57 (40.71)	38 (62.30)	
Disability (WHODAS 2.0) (M±SD)			
total disability	25.21±14.85	10.18±10.87	<0.001[a]
Do1 Cognition	30.71±21.06	12.62±19.66	<0.001[a]
Do2 Mobility	30.98±22.45	11.07±17.17	<0.001[a]

Table 4. Dependence of work ability of the studied population on selected factors in the Podkarpackie and Świętokrzyskie voivodeships, Poland, in November 2018–March 2019 – cont.

Selected factor	Respondents' work ability (N = 201)		p
	at most moderate (N = 140)	at least good (N = 61)	
Disability (WHODAS 2.0) (M±SD) – cont.			
Do3 Self-care	13.86±20.09	3.93±11.15	0.001[a]
Do4 Getting along	25.48±23.09	12.30±16.15	<0.001[a]
Do5.1 Life activities – domestic responsibilities	32.14±22.50	14.75±17.28	<0.001[a]
Do5.2 Life activities – work	28.67±20.18	9.48±14.10	<0.001[a]
Do6 Participation	30.54±20.33	13.87±14.10	<0.001[a]
Quality of life (WHOQOL-BREF) (M±SD)			
total quality of life	60.24±12.45	75.05±9.87	<0.001[a]
Do1 Psychological	58.97±14.64	77.41±11.38	<0.001[a]
Do2 Physical	58.16±19.08	72.74±13.91	<0.001[a]
Do3 Social relationships	62.99±19.08	76.15±14.44	<0.001[a]
Do4 Environment	60.82±13.29	73.89±11.15	<0.001[a]

[a] The Mann-Whitney U test.
[b] The χ^2 test.
Abbreviations as in Tables 2 and 3.

the functional and health-related needs of older employees. Along with the appropriate adaptation of the workplace, the chance of at least a good work ability increased almost 8-fold (OR = 7.79). As for at least a good work ability, it was also significantly affected by a higher quality of life in the psychological domain (OR = 1.12) and higher efficiency in the cognitive domain (OR = 0.97). Each subsequent illness reduced the chance of at least a good work ability (OR = 0.58) (Table 5).

DISCUSSION

The demographic and economic conditions of the country indicate the need to extend the period of professional activity in Poland. The necessity of longer employment should be associated with parallel actions related to age management, which will allow for the rational and effective use of human resources, taking into account the func-

tional and health-related needs of employees. Opportunities for work performance change with age, which is caused mainly by a decrease in both efficiency and physical and mental capability.

Speaking of the study groups of elderly people of both preretirement and retirement age, who continued to pursue professional activities, the authors found that nearly half of the respondents had a moderate work ability, whereas almost every fourth person had a poor or good work ability. In contrast, a very small percentage of the study population had excellent work ability. The average level of general disability was mild, and a moderate level of disability was found in the performance of life activities – domestic responsibilities, participation in society and cognition activities. The average level of the total quality of life in the study population was quite good, with the highest average quality of life being found in the social relations

Table 5. The logistic regression model used to assess factors influencing at least a good work ability (N = 201) in the Podkarpackie and Świętokrzyskie voivodeships, Poland, in November 2018–March 2019

Variable	At least a good work ability		p
	OR	95% CI	
Do1 Psychological (WHOQOL-BREF)	1.12	1.07–1.17	<0.001
Do1 Cognition (WHODAS 2.0)	0.97	0.95–0.99	0.008
Workplace adaptation (reference: no) – yes	7.79	2.05–29.56	0.003
Chronic diseases [n]	0.58	0.45–0.74	<0.001

Abbreviations as in Table 3.

domain, and the lowest in the domain of physical health. The authors did not find any statistically significant differences in the range of disability and the quality of life between the surveyed people of pre-retirement and retirement age. They confirmed the high average number of chronic diseases in the study population (almost 4 diseases), and it was found to rise significantly with age.

Moreover, the authors found that the majority of the surveyed people did not keep a proper diet and were not as physically active as they should. A significant problem among the respondents was the presence of a fairly high level of pain, and a high incidence of depression, as well as musculoskeletal and cardiovascular diseases. The most important factor contributing to a better work ability of elderly people was the adaptation of the workplace to their functional and health-related needs. What is more, mental well-being and cognitive performance, as well as fewer chronic diseases, were also important factors.

In this study, the authors showed that nearly half of the respondents had a moderate work ability (46.77%). Almost every fourth person had a poor work ability (22.89%), or a good work ability (24.88%). Only 11 people had an excellent work ability and they were all of pre-retirement age. There were no statistically significant differences in the ability to work between the people of pre-retirement and retirement age. Work ability in the EU countries usually decreases with age, although the average scores for people of working age (i.e., 20–65 years) fall into the good-to-excellent category. A longitudinal study showed that, speaking of people aged >45 years, about 60% maintained a good or excellent work ability, decreasing by slightly less than 30%, and increasing by just below 10%, during the 11 years of the study. The results were similar for both men and women [18].

Individual differences in work ability tend to increase with age. The population of employees aged >45 years is more heterogeneous compared to younger generations. The WAI assessment is moderate or poor for approximately 15–30% of employees [19]. With regard to this study, the vast majority (69.66%) of the employees engaged in intellectual work had a moderate or poor work ability. This is a very alarming phenomenon, requiring urgent interest, broader research and the implementation of some systemic remedies in the context of the country's demographic aging.

In this study, the authors determined an average mild level of general disability among the surveyed people. There were no significant differences between the people of pre-retirement and retirement age. However, a poor ability to perform professional work was significantly associated with higher levels of disability. Other studies have indicated that musculoskeletal disorders are the most common cause of disability among older workers [19]. In this study, the authors noticed that a poor work ability among

the people of pre-retirement and retirement age was associated with the occurrence of musculoskeletal diseases and pain. In fact, musculoskeletal disorders are the main reason for reduced work efficiency and sick leaves in many developed countries [20]. Musculoskeletal diseases occur in younger and older employees, but in the latter group they cause a significant reduction in work ability over time [21]. Musculoskeletal pain, especially back pain and neck pain, is very common in the elderly population causing disability and high costs for society [22].

Cardiovascular diseases also had a significant impact on the poor work ability among the people participating in this study. However, these diseases are associated with chronic stress at work, to a large extent. In addition, elderly people generally have an increased risk of disability and death due to cardiovascular diseases [23].

With reference to this study, it was noted that the second major health problem significantly affecting the reduction of work ability was the surveyed people's mental condition. The occurrence of depression is significantly associated with the occurrence of chronic diseases and a reduced efficiency in performing professional activities, which lowers the elderly people's ability to work [24]. Increased symptoms of depression are relevantly associated with a high workload, and high stress is combined with a low level of job satisfaction among the elderly [25].

The fact that a proper diet was not followed by the surveyed people of both pre-retirement and retirement age, and their physical activity was not sufficient, also posed a major problem in the study population, as these are very important factors affecting the occurrence of disability. An adequate level of physical activity and a higher quality of diet significantly prevent the decrease in work ability. There is scientific evidence that following a rational diet is associated with a relevantly lower risk of functional disability [26]. Physical activity, in turn, reduces the level of depression and disability in the elderly [27]. The same relationships applies to workers of both pre-retirement and

retirement age. In the light of strong evidence, it can be revealed that structured physical activity programs for elderly people reduce the burden of disability. Undertaking vigorous physical activity is also associated with a reduced risk of retirement. Therefore, promoting vigorous physical activity among middle-aged and older workers can help prevent absenteeism at work and retirement because of ill health [28]. Finally, lifestyle is another important factor associated with a better health condition and well-being of elderly people.

In this study, the average total quality of life was fairly good, but there was a significant link between a low work ability and a lower quality of life. A poor quality of life is associated with a higher number of chronic diseases, disability [6], and worse economic conditions [29]. In contrast, physical activity and social participation have a positive impact on the quality of life of elderly people. Professional activity increases self-esteem, positively influencing interpersonal contacts, family relationships and the economic status. Research conducted on the quality of life of working and non-working older populations indicates a higher quality of life for older workers, which is usually associated with a better financial situation, as well as with maintaining a higher level of psychophysical and social activity [8].

The authors proved that the most important factor contributing to a better work ability among elderly people was the adaptation of the workplace to their functional and health-related needs. In addition to the physical adjustment of the workplace, work organization should also be considered properly. A particular problem that is necessary to solve is the faster fatigue of older employees, both when performing intellectual and physical work. Other obstacles are related to the need of sitting for a long time at the computer, standing, carrying heavy objects, or driving vehicles [30]. They also found that a high quality of life in the psychological domain was an important factor affecting work ability. To a large extent, it is related to

good relationships in the workplace and a sense of self-usefulness at work.

What is more, cognitive efficiency is also extremely important for work ability. It is worth mentioning the growing difficulties of older workers in performing tasks requiring split attention, or a lower speed of information processing, as well as an impairment of their sensory organs, such as poor visual acuity in weak light, or hearing loss. Older employees require individualized and various types of support related to the adaptation of the workplace from employers, in order to maintain a higher level of work ability [31]. It is necessary to consider the involvement of physiotherapists, occupational therapists, professional specialists, psychologists, and health and safety experts in the adaptation of the workplace to older employees.

Work ability in older age is built up throughout the entire life cycle. Policies aimed at increasing longevity on the labor market must take into account the proper care for employees throughout their entire working life. Moreover, a higher work ability before retirement has a long-term effect on maintaining a good capability for performing daily activities once a person retires, which is also extremely important in the individual aspect, as well as in the social and economic dimensions of the country. Therefore, the effective promotion of work ability has some long-term effects and may indirectly affect the aging process. Investments in the third age without disability should be implemented during working life.

Limitations

The study includes some limitations, related mainly to its pilot nature which does not allow for the conclusions to be generalized over a larger population. At the same time, the advantage of the pilot study is to identify areas that require detailed exploration when planning and conducting a broader survey. Therefore, it is extremely useful for researchers preparing extensive research projects on the work ability of elderly people.

CONCLUSIONS

Economic activity and health of elderly people are very important factors in relation to the problems of the demographic aging of the population in Poland. In the discussed cross-sectional pilot study, the authors assessed the work ability, health status, disability and quality of life of working people of pre-retirement and retirement age, as well as analyzed factors affecting the ability to work in older age. Speaking of the surveyed population, the authors found that the vast majority of employees doing intellectual work had a moderate or poor work ability. The average level of general disability in the studied group was mild, but it was substantively increasing together with a decrease in work ability. Moreover, the average level of the total quality of life in the study population was quite good but it decreased relevantly with a drop in work ability. The authors did not find any statistically significant differences in disability and the quality of life between the surveyed people of pre-retirement and retirement age. However, they confirmed the high average number of chronic diseases in the study population (almost 4 diseases), which was increasing significantly together with age and a decrease in work ability.

It was demonstrated that most of the surveyed people did not care for a proper diet and were not as physically active as they should. A great problem among the respondents was quite a high average level of pain, a high incidence and intensity of depression, as well as the presence of musculoskeletal and cardiovascular diseases. The most important factor contributing to a better work ability of elderly people was the adaptation of the workplace to their functional and health-related needs. Mental well-being and cognitive performance, as well as fewer chronic diseases, were also important factors.

Preparing the society of older age for professional activity is a big challenge. It should take place at least in 2 ways. First of all, education and implementation of an active, healthy lifestyle, and increasing control over one's own health and factors determining it, are worth mentioning. It is also necessary to focus on the proper organization

of the working space in cooperation with an interdisciplinary team of specialists, as well as on quick access to comprehensive treatment and rehabilitation, especially in the field of musculoskeletal and cardiovascular diseases, aimed at preventing these diseases and ensuring treatment in order to maintain health and the quality of life at the highest level.

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