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

AGNIESZKA ĆWIRLEJ-SOZAŃSKA, MARIA WIDELAK, MARLENA WIERNASZ, IWONA WAWRZYKOWSKA, and NATALIA TURKOSZ

Medical College of Rzeszow University, Rzeszów, Poland
Institute of Health Sciences

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

Received: December 31, 2019. Accepted: August 21, 2020.
Corresponding author: Agnieszka Ćwirlej-Sozańska, Medical College of Rzeszow University, Institute of Health Sciences, Warzywna 1A, 35-310 Rzeszów, Poland (e-mail: sozanska@ur.edu.pl).
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 multi-stage 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
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.
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<sup>a</sup> |
| Sex [n (%)]                                        |                       |       |       | 0.001<sup>b</sup> |
| 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<sup>b</sup> |
| countryside                                       | 106 (52.74)           | 71 (53.38) | 35 (51.47) |
| town                                               |                       |       |       | 0.003<sup>b</sup> |
| ≤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 (%)]                             |                       |       |       | 0.796<sup>b</sup> |
| single                                             | 56 (27.86)            | 28 (21.05) | 28 (41.18) |
| in a relationship                                  | 145 (72.14)           | 105 (78.95) | 40 (58.82) |
| Education [n (%)]                                  |                       |       |       | 0.019<sup>b</sup> |
| 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 (%)]                              |                       |       |       | 0.001<sup>b</sup> |
| 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 (%)]                         |                       |       |       | 0.482<sup>b</sup> |
| 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<sup>b</sup> |
| 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 (%)]     |                       |       |       | 0.019<sup>b</sup> |
| 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) |
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).

### 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.

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**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 [%])                                         |                                                                       |                                |                       |
| yes                                                                      | 71 (35.32)                                                               | 48 (36.09)                     | 23 (33.82)            |
| no                                                                       | 130 (61.68)                                                              | 85 (63.91)                     | 45 (66.18)            |
| Workplace (n [%])                                                        |                                                                       |                                |                       |
| 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 [%])          |                                                                       |                                |                       |
| 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 [%])                                          |                                                                       |                                |                       |
| 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)            |

* The Mann-Whitney U test.  
* The $\chi^2$ test.  
WAI – Work Ability Index.
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 = 0.011) (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 2. Disability and quality of life of the study population in the Podkarpackie and Świętokrzyskie voivodeships, Poland, in November 2018–March 2019 |
|-----------------------------|-----------------|-----------------|-----|
| Disability (WHODAS 2.0) (M±SD) | Respondents | Respondents | Respondents |
| Variable | (N = 201) | (N = 133) | (N = 68) | p |
| 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 = 0.011) (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 |
| Smoking cigarettes (n [%])                   |                       |        |          |
| yes                                           | 59 (29.35)            | 39 (29.32) | 20 (29.41) |
| no                                            | 142 (70.65)           | 94 (70.68) | 48 (70.59) |
| Alcohol consumption (n [%])                  |                       |        |          |
| 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 [%]) | | | |
| 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 [%])  |                       |        |          |
| yes                                           | 39 (19.40)            | 26 (19.55) | 13 (19.12) |
| no                                            | 162 (80.60)           | 107 (80.45) | 55 (80.88) |
| Performing physical exercises (n [%])         |                       |        |          |
| yes                                           | 87 (43.28)            | 55 (41.35) | 32 (47.06) |
| no                                            | 114 (56.72)           | 78 (58.65) | 36 (52.94) |
| Using mobility aids (n [%])                  |                       |        |          |
| 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 |
| Depression (GDS) (n [%])                      |                       |        |          |
| 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 [%])              |                       |        |          |
| yes                                           | 88 (43.78)            | 54 (40.60) | 34 (50.00) |
| no                                            | 113 (56.22)           | 79 (59.40) | 34 (50.00) |
| Musculoskeletal diseases (n [%])              |                       |        |          |
| yes                                           | 129 (64.18)           | 79 (59.40) | 50 (73.53) |
| no                                            | 72 (35.82)            | 54 (40.60) | 18 (26.47) |
| Cardiovascular diseases (n [%])               |                       |        |          |
| yes                                           | 105 (52.24)           | 61 (45.86) | 44 (64.71) |
| no                                            | 96 (47.76)            | 72 (54.14) | 24 (35.29) |
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

| Variable                                       | Respondents (N = 201) | p     |
|------------------------------------------------|-----------------------|-------|
|                                                | total                 |       |
|                                                | pre-retirement age    |       |
|                                                | (N = 133)             |       |
|                                                | retirement age        |       |
|                                                | (N = 68)              |       |
| Respiratory diseases (n [%])                   |                       |       |
| yes                                           | 53 (26.37)            |       |
| no                                            | 148 (73.63)           |       |
| Neurolgical and sense organ disease (n [%])    |                       |       |
| yes                                           | 59 (29.35)            |       |
| no                                            | 142 (70.65)           |       |
| Gastrointestinal diseases (n [%])              |                       |       |
| yes                                           | 40 (19.90)            |       |
| no                                            | 161 (80.10)           |       |
| Genitourinary diseases (n [%])                 |                       |       |
| yes                                           | 29 (14.43)            |       |
| no                                            | 172 (85.57)           |       |
| Endocrine and metabolic diseases (n [%])       |                       |       |
| yes                                           | 73 (36.32)            |       |
| no                                            | 128 (63.68)           |       |

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

- $^a$ The Mann-Whitney U test.
- $^b$ The $\chi^2$ test.

GDS – Geriatric Depression Scale; VAS – Visual Analogue Scale.

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 [%])                                          |                                    |         |
| pre-retirement                                       | 92 (65.71)                        | 41 (67.21) | 0.836 <sup>a</sup> |
| retirement                                           | 48 (34.29)                        | 20 (32.79) |
| Chronic diseases (M±SD)                              | 4.64±2.77                         | 2.11±1.64 | <0.001 <sup>a</sup> |
| Smoking cigarettes (n [%])                           |                                    |         |
| yes                                                  | 46 (32.86)                        | 13 (21.31) | 0.098 <sup>b</sup> |
| no                                                   | 94 (67.14)                        | 48 (78.69) |
| Alcohol consumption (n [%])                          |                                    |         |
| yes                                                  | 49 (35.00)                        | 18 (29.51) | 0.448 <sup>b</sup> |
| no                                                   | 91 (65.00)                        | 43 (70.49) |
| Eating according to the pyramid of healthy nutrition (n [%]) |                                    |         |
| yes                                                  | 47 (33.57)                        | 20 (32.79) | 0.914 <sup>b</sup> |
| no                                                   | 93 (66.43)                        | 41 (67.21) |
| Using mobility aids (n [%])                          |                                    |         |
| yes                                                  | 32 (22.86)                        | 5 (8.20)  | 0.002 <sup>b</sup> |
| no                                                   | 108 (77.14)                       | 56 (91.80) |
| Workplace adapted to functional and health-related needs (n [%]) |                                    |         |
| yes                                                  | 94 (67.14)                        | 54 (88.52) | 0.002 <sup>b</sup> |
| no                                                   | 46 (32.86)                        | 7 (11.48)  |
| Physical activity for ≥150 min/week (n [%])         |                                    |         |
| yes                                                  | 24 (17.14)                        | 15 (24.59) | 0.220 <sup>b</sup> |
| no                                                   | 116 (82.86)                       | 46 (75.41) |
| Performing physical exercises (n [%])                |                                    |         |
| yes                                                  | 55 (39.29)                        | 29 (47.54) | 0.083 <sup>b</sup> |
| no                                                   | 85 (60.71)                        | 29 (47.54) |
| Pain (VAS) (M±SD)                                    | 4.63±2.28                         | 2.54±2.08 | <0.001 <sup>a</sup> |
| Depression (GDS) (n [%])                             |                                    |         |
| yes                                                  | 83 (59.29)                        | 23 (37.70) | 0.005 <sup>a</sup> |
| 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 <sup>a</sup> |
| Do1 Cognition                                        | 30.71±21.06                       | 12.62±19.66 | <0.001 <sup>a</sup> |
| Do2 Mobility                                         | 30.98±22.45                       | 11.07±17.17 | <0.001 <sup>a</sup> |
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 functional 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 pre-retirement 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 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 | p |
|-----------------|--------------------------|---|
| Disability (WHODAS 2.0) (M±SD) – cont. | at most moderate (N = 140) | at least good (N = 61) | |
| Do3 Self-care | 13.86±20.09 | 3.93±11.15 | 0.001<sup>a</sup> |
| Do4 Getting along | 25.48±23.09 | 12.30±16.15 | <0.001<sup>b</sup> |
| Do5.1 Life activities – domestic responsibilities | 32.14±22.50 | 14.75±17.28 | <0.001<sup>b</sup> |
| Do5.2 Life activities – work | 28.67±20.18 | 9.48±14.10 | <0.001<sup>b</sup> |
| Do6 Participation | 30.54±20.33 | 13.87±14.10 | <0.001<sup>b</sup> |
| Quality of life (WHOQOL-BREF) (M±SD) | | | |
| total quality of life | 60.24±12.45 | 75.05±9.87 | <0.001<sup>b</sup> |
| Do1 Psychological | 58.97±14.64 | 77.41±11.38 | <0.001<sup>b</sup> |
| Do2 Physical | 58.16±19.08 | 72.74±13.91 | <0.001<sup>b</sup> |
| Do3 Social relationships | 62.99±19.08 | 76.15±14.44 | <0.001<sup>b</sup> |
| Do4 Environment | 60.82±13.29 | 73.89±11.15 | <0.001<sup>b</sup> |

<sup>a</sup> The Mann-Whitney U test.
<sup>b</sup> The χ² test.
Abbreviations as in Tables 2 and 3.
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 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

| Variable | At least a good work ability | p |
|----------|-------------------------------|---|
| 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.
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
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 work ability 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.
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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