

# WORK ABILITY OF AGING TEACHERS IN BULGARIA

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## Abstract

**Objectives:** The work ability of aging teachers is of special interest because of high risk of stress. The aim of the study was to follow the work ability of aging teachers and compare it with that of aging non-teacher professionals. **Material and Methods:** The study included 424 teachers of age  $\leq 44$  years old ( $N = 140$ ) and  $\geq 45$  years old ( $N = 284$ ), with about 10% male teachers in both age groups, matched by sex and age with non-teacher professionals. Work ability was assessed by means of the Work Ability Index (WAI).  $\chi^2$  tests and regression analyses were used for studying WAI scales ratings, diagnosed by physician diseases and WAI ratings. **Results:** Our data shows comparatively high work ability for both age groups of teachers but WAI of aging teachers was significantly lower in comparison to their younger colleagues as well as aging non-teacher professionals. About 80% of aging groups reported diseases diagnosed by physicians. Cardiovascular, musculoskeletal and respiratory diseases were the most frequently reported by aging teachers, while teachers  $\leq 44$  years old reported respiratory, cardiovascular, neurological and sensory diseases. With aging significantly higher rates of arterial hypertension, diabetes, injury to hearing and mental disorders were reported by teachers as compared to aging non-teacher professionals. The rates of reported repeated infections of respiratory tracts were high in both age groups of teachers, especially in the group of aging teachers. The estimated work ability impairment due to the disease showed the significant effect of aging for teachers as well as the significant difference when comparing aging teachers and non-teacher professionals. **Conclusions:** Our data shows high work ability for both age groups of teachers but significantly lower for aging teachers accompanied with higher rates of psychosomatic diseases, including hearing impairment and respiratory diseases. Preservation of teacher health could contribute to maintenance of their work ability and retention in the labor market. *Int J Occup Med Environ Health* 2018;31(5):593–602

## Key words:

Aging, Teachers, Work ability index, Work ability, Cross-sectional study, Adverse health effects

## INTRODUCTION

The work ability of teachers is of special interest from an occupational point of view because of high risk of stress [1–4]. Stress at work is known to contribute to ill-health [5], mainly increasing cardiovascular, metabolic, endocrine and mental diseases. There is the data showing higher rates of diseases with psychosomatic origin in the case of teachers [6,7] but also high rates of musculoskeletal disorders [8], voice problems [9,10], etc.

Aging is known to influence work ability, too, and the results of the TALIS (Teaching and Learning International Survey) 2013 study [11] showed higher mean age of Bulgarian teachers (47.4 years old) as compared to the European Union (EU) sample (42.9 years old), respectively. More aging teachers accounted for 46.7% of Bulgarian teachers who were of age  $\geq 45$  years old as compared to 30.1% of the EU teachers. Along with aging, poor functional capacities, poor health and differ-

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ent work characteristics are known to influence work ability [12,13].

The Finish Institute of Occupational Health Work Ability Index (WAI) [14] developed a reliable and informative instrument, an internationally used measurement instrument both in research and practice [15], giving the possibility to compare results between different occupational groups and populations and develop measures for maintaining and improving work ability. It is known that high work ability is accompanied with a longer active work life [16], while low work ability – with early retirement [17] and prolonged and frequent sick leave absences [18]. There is some data for higher rates of early retirement of teachers in the EU countries in comparison to other employees in public service [19]. In our country the official age of a teacher's retirement is 3 years lower in comparison to the general population. It was reduced after a study 20 years ago, showing very high levels of stress of the teachers in Sofia [20]. A recent study [21] has shown positive trend, teachers indicated an average of 7 features in their work as a source of constant tension, stress and reduced performance, and an average of 6 permanent health complaints for the last 6 months, but also higher rates of diseases with psychosomatic origin and lower WAI in comparison to a group of professionals with similar educational attainment and social status [22], but the aging aspects of work ability were not followed.

The aim of the study was to follow the work ability of aging teachers and compare it with that of aging non-teacher professionals.

## MATERIAL AND METHODS

The design of the study is cross sectional; comprised teachers from 18 schools in Sofia with participation of 442 teachers (participation rate of 41.3%). There was missing data in 18 questionnaires, and finally 424 teachers were studied, 44 males and 380 females, aged  $47.7 \pm 8.9$  years old with the mean length of service equivalent to  $23.7 \pm 9.4$  years.

The study sample of 424 teachers included 140 teachers of age  $\leq 44$  years old, and 284 ones of age  $\geq 45$  years old, with about 10% male teachers in both age groups. The work ability of 2 groups of teachers was compared with work ability of non-teacher professionals with similar educational attainment and social status, administration staff, matched by sex and age with the mean length of service equivalent to  $24.1 \pm 8.8$  years. For shorter we shall indicate the group of non-teacher professionals only as "Professionals." All the subjects from the teacher and non-teacher professional groups worked in the public sector.

The teachers and non-teachers group filled in the questionnaire on various job and socio-demographic characteristics, strain sources and psychosomatic complaints, the data published in details earlier [21]. Work ability was assessed by means of the WAI [14]. The questionnaire entails 7 dimensions, each covered by means of one or more questions: current work ability compared with lifetime best, work ability in relation to job demands, the number of diagnosed diseases, subjective estimate of work impairment due to diseases, sicknesses absence during the past year, own prognosis of work ability 2 years later and mental resources. The WAI was calculated by summing the points of each item. The final index score range was 7–49 points and the value indicated the work ability and the objectives of measures needed as follows: 7–27 points – poor work ability, restore work ability; 28–36 points – moderate work ability, improve work ability; 37–43 points – good work ability, support work ability; 44–49 points – excellent work ability, maintain work ability. The study was approved by the ethical committee of the National Center of Public Health and Analyses. All the participants signed inform consents.

The mean WAI values of the groups were compared with one-way ANOVA. The  $\text{Chi}^2$  test were used for comparing the WAI, WAI scales ratings, the diseases diagnosed by physicians, work ability impairment due to diseases, etc., in the case of teacher and non-teacher professionals. A regression analysis was used for exploring the relationship

of the WAI scales with dependents 4 of the WAI scales: current work ability compared with lifetime best, work ability in relation to job demands, subjective estimate of work impairment due to diseases, own prognosis of work ability 2 years later and as predictors personal data as age, length of service, sex, mental resources, score for number of diagnosed diseases, diagnosed diseases by group, e.g., cardiovascular diseases, mental diseases, etc., sicknesses absence during the past year. Statistical processing was performed using SPSS 13.0 software.

## RESULTS

Our data showed high work ability of teachers and non-teacher professionals of age  $\leq 44$  years old ( $M \pm SD = 39.6 \pm 5.4$  years old and  $38.9 \pm 7.2$  years old, respectively). The mean work ability of aging teachers and non-teacher professionals was significantly lower in comparison to the corresponding group of age  $\leq 44$  years old ( $37.9 \pm 6.1$  for aging teachers and  $38.3 \pm 5.8$  for aging non-teacher professionals). No significant differences in the percentage share of persons with excellent, good, moderate and poor work ability between the groups of

age  $\leq 44$  years old were found (Figure 1), but with the aging the percentage share of persons with excellent work ability decreased and the percentage share of persons with moderate work ability increased for both teachers and non-teacher professionals, but significantly only for the teachers ( $\chi^2 = 15.025, p < 0.002$ ). The percentage share of aging teachers with excellent work ability was lower in comparison to aging non-teacher professionals, and the percentage share of aging teachers with moderate work ability was higher in comparison to aging non-teacher professionals ( $\chi^2 = 13.348, p < 0.0001$ ).

More than 75% of the respondents of all groups considered their work ability in comparison to lifetime best as excellent or good, and more than 85% rated with high scores their work ability in relation to job demands. The aging teachers reported lower work ability in comparison to lifetime best in comparison to aging non-teacher professionals ( $\chi^2 = 7.903, p < 0.005$ ), but no significant differences between the groups were found for work ability in relation to job demands, comparing both aging teachers with aging non-teacher professionals and aging groups with the groups of age  $\leq 44$  years of age.

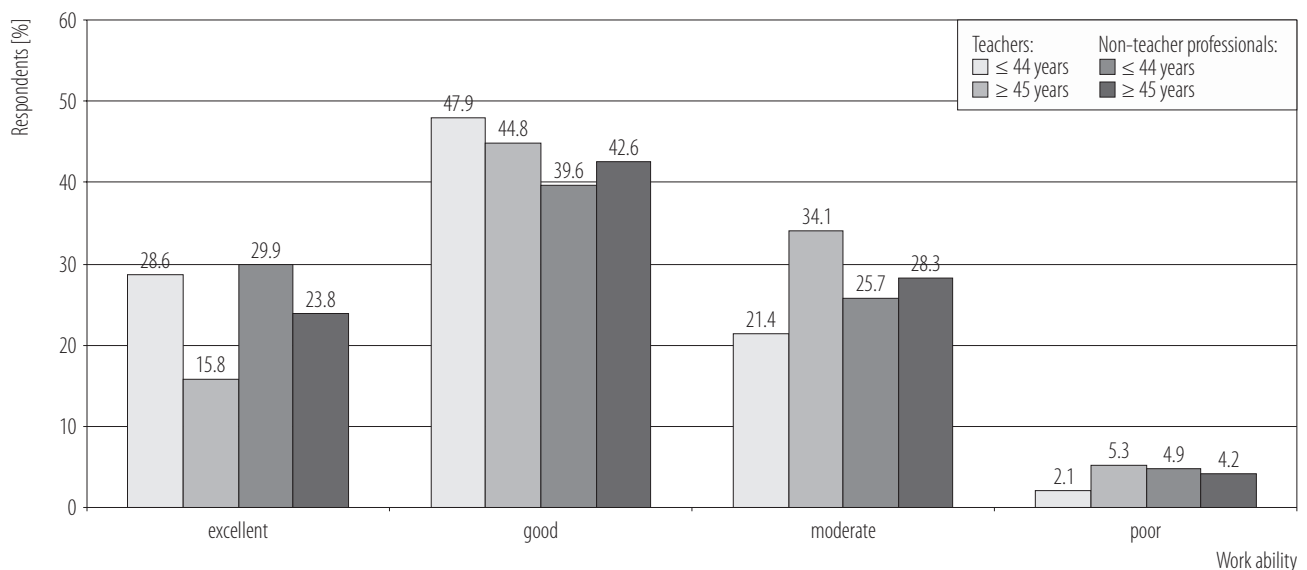
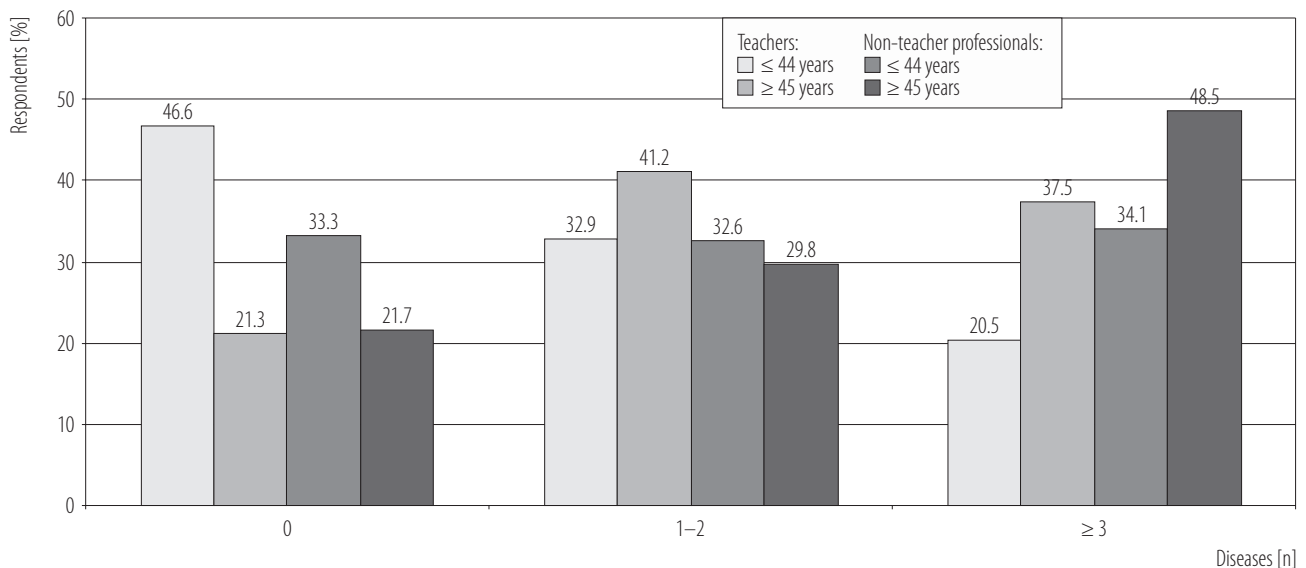


Fig. 1. Teachers and non-teacher professionals work ability, by age



**Fig. 2.** Teachers and non-teacher professionals' prevalence of diseases diagnosed by physician, by age

As could be expected the aging groups, both teachers and non-teacher professionals had reported significantly more diseases diagnosed by physicians as compared to the groups  $\leq 44$  years old. More aging teachers reported 1–2 diseases, while the non-teacher professionals – 3 and more than 3 diseases (Figure 2). Cardiovascular diseases and musculoskeletal disorders were the most frequently reported by the teachers  $\geq 45$  years old and non-teacher professionals  $\geq 45$  years old, followed by respiratory diseases, digestive disorders, neurological and sensory diseases, endocrine diseases (Figure 3), while teachers  $\leq 44$  years old reported respiratory diseases, cardiovascular diseases, neurological and sensory diseases, digestive diseases, musculoskeletal disorders, endocrine diseases. The difference in disease rate between the 2 age groups of teachers was the highest for musculoskeletal disorders ( $\text{Chi}^2 = 32.159$ ,  $p < 0.0001$ ) and cardiovascular diseases ( $\text{Chi}^2 = 29.155$ ,  $p < 0.0001$ ). The non-teacher professionals showed the greatest increase of musculoskeletal disorders, cardiovascular, digestive and respiratory diseases in relation to aging. With aging significantly higher rates of arterial hypertension were reported by teachers (36.3% of aging teachers,

compared to 27.7% of aging non-teacher professionals;  $\text{Chi}^2 = 5.356$ ,  $p < 0.02$ ), as well as diabetes (3.9% of aging teachers against 1.2% of aging non-teacher professionals;  $\text{Chi}^2 = 4.711$ ,  $p < 0.05$ ). The rates of reported repeated infections of respiratory tracts were high in both age groups of teachers, especially in the case of aging teachers (18% compared to 9.5% in aging non-teacher professionals;  $\text{Chi}^2 = 9.199$ ,  $p < 0.01$ ). The rates of chronic bronchitis and chronic sinusitis were significantly higher in the case of aging teachers in comparison to younger ones ( $\text{Chi}^2 = 4.598$ ,  $p < 0.05$  and  $\text{Chi}^2 = 7.445$ ,  $p < 0.01$ , respectively), and higher in both age groups of teachers in comparison to non-teacher professionals, the differences did not reach significance.

With aging higher rates of eye diseases or injuries (other than refractive error), hearing problems or hearing impairment and neurological diseases were reported by teachers. The rates of problems or hearing impairment were significantly higher in the case of aging teachers in comparison to aging non-teacher professionals (8.5% against 4.7%, respectively;  $\text{Chi}^2 = 3.501$ ,  $p < 0.05$ ). The aging teachers reported a higher rate of mental disorders, especially

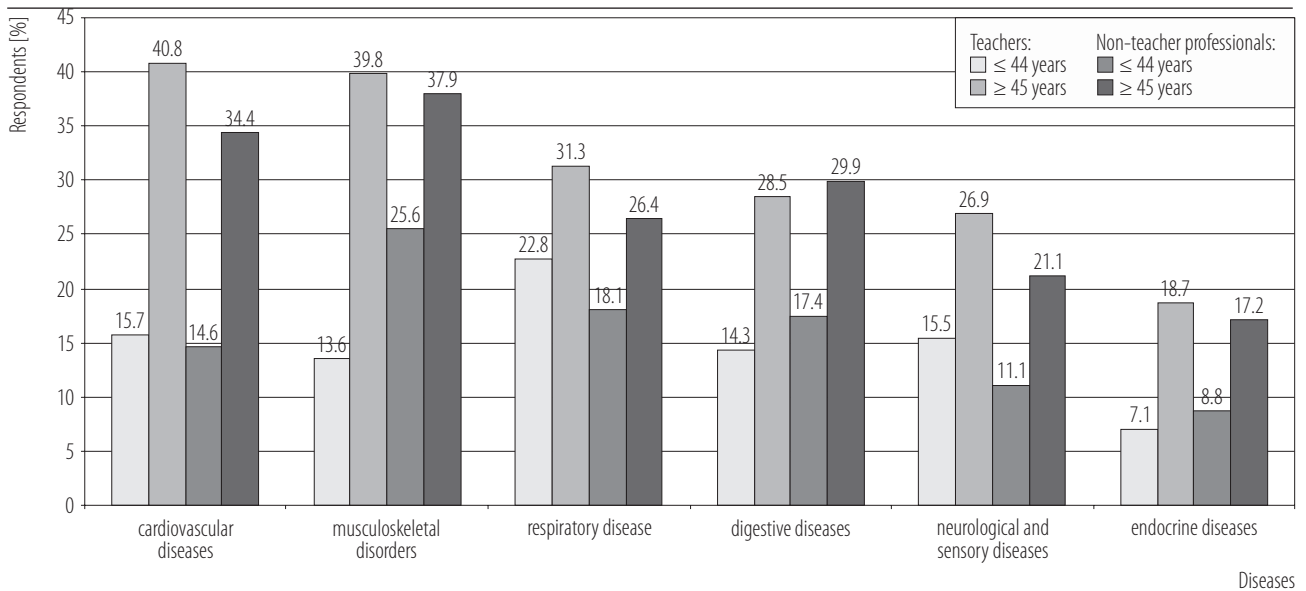


Fig. 3. Teachers and non-teacher professionals' diseases diagnosed by physician, by age

slight mental disorders and problems (11.3%) such as slight depression, tension, anxiety, insomnia in comparison to younger teachers (4.9%;  $\chi^2 = 5.333$ ,  $p < 0.05$ ). They also reported higher rates of slight mental disorders and problems (11.3%) in comparison to aging non-teacher professionals (5%;  $\chi^2 = 8.199$ ,  $p < 0.01$ ).

The estimated work ability impairment due to disease showed a significant effect of aging for teachers ( $\chi^2 = 8.869$ ,  $p < 0.01$ ) as well as significant difference comparing the ratings of aging teachers and aging non-teacher professionals ( $\chi^2 = 4.341$ ,  $p < 0.05$ ). The Figure 4 shows that diseases are more likely to slow down

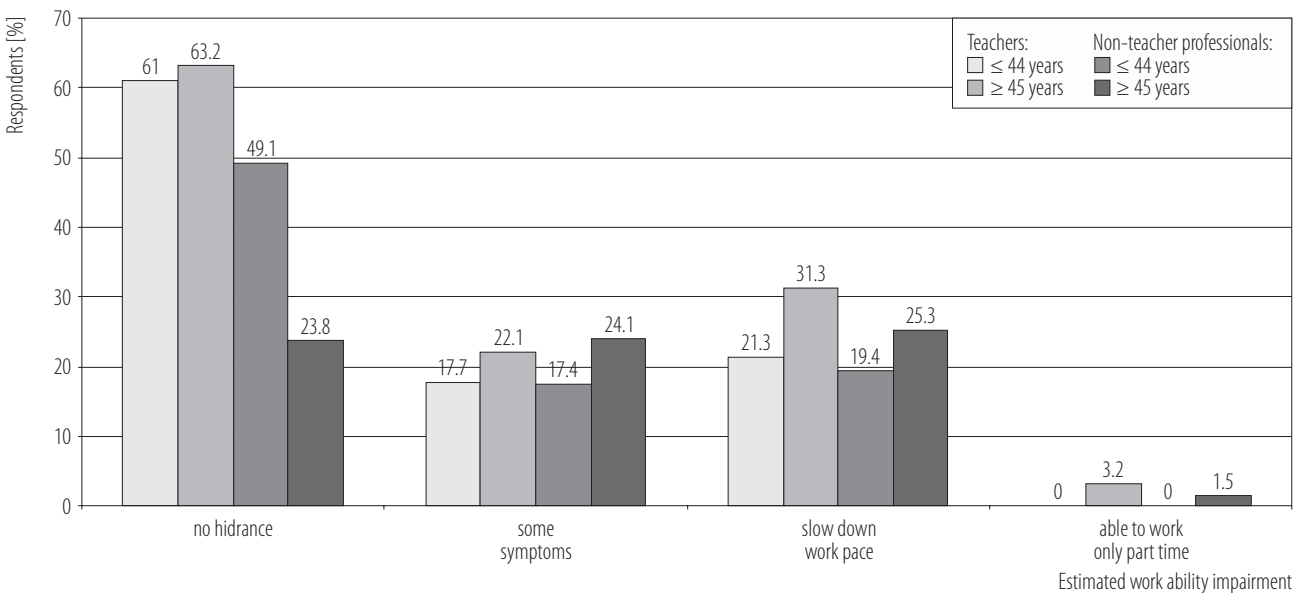


Fig. 4. Teachers and non-teacher professionals' estimated work ability impairment due to diseases, by age

the pace or limit work duration (be able to work only part time) in the case of aging teachers compared to aging non-teacher professionals.

No sick leave significant differences between both age and occupational groups were found. Nearly a half of the teachers  $\leq 44$  years old (49.3%) and 48.9% of the aging teachers and 51 to 55% of non-teacher professionals had not been off work because of sick leave during the last year. Sick absences of at most 9 days prevailed (36.2% of the teachers  $\leq 44$  years old and 32% of the aging teachers; 25.6% and 28.8% for non-teacher professionals), followed by a sick leave of 10–24 days (11.6% of the teachers  $\leq 44$  years and 12.1% of aging teachers; 11% and 14.5% of non-teacher professionals). The rate of long term sickness absences was low in all followed groups.

The data showed stored mental resources in 2/3 of the subjects of all groups, with no significant differences between the groups. A great deal of the studied subjects from both age groups of teachers were optimistic in their 2-year prognosis of work ability, but the rate of optimistic subjects was significantly higher in the group of younger teachers ( $\text{Chi}^2 = 6.967$ ,  $p < 0.01$ ) as well as aging non-teacher professionals in comparison to aging teachers ( $\text{Chi}^2 = 9.608$ ,  $p < 0.005$ ).

The data of the stepwise regression model (Table 1) showed that current work ability compared to lifetime best was related to mental resources and negatively related to musculoskeletal disorders. The work ability in relation to job demands was predicted by mental resources, the estimated score for the number of diagnosed diseases and negatively by neurological and sensory organ diseases.

**Table 1.** Stepwise multiple regression analysis for Work Ability Index (WAI) scales of teachers group

Dependent and predictor	$\beta$	t	p
Current work ability compared to lifetime best <sup>a</sup>			
mental resources	0.414	9.958	< 0.000
musculoskeletal disorders	-0.300	-6.931	< 0.000
Work ability in relation to job demands <sup>b</sup>			
mental resources	0.432	9.938	< 0.000
score for number of diagnosed diseases	0.155	3.143	< 0.002
neurological and sensory organ diseases	-0.116	-2.369	< 0.02
Estimated work ability impairment due to diseases <sup>c</sup>			
musculoskeletal disorders	0.253	4.904	< 0.000
digestive diseases	0.187	3.768	< 0.000
mental disorders	0.178	3.790	< 0.000
cardiovascular diseases	0.104	2.187	< 0.05
Prognosis for work ability for 2-year period <sup>d</sup>			
mental disorders	-0.199	-4.072	< 0.000
neurological and sensory organ diseases	-0.168	-3.446	< 0.001
age	-0.119	-2.072	< 0.02
mental resources	0.117	2.439	< 0.02

<sup>a</sup>  $R^2$  for the model = 27.6%,  $F = 73.812$ ,  $p < 0.000$ .

<sup>b</sup>  $R^2$  for the model = 25.9%,  $F = 47.471$ ,  $p < 0.000$ .

<sup>c</sup>  $R^2$  for the model = 25.5%,  $F = 33.839$ ,  $p < 0.000$ .

<sup>d</sup>  $R^2$  for the model = 11.7%,  $F = 13.898$ ,  $p < 0.000$ .

The estimated work ability impairment due to disease was related to musculoskeletal disorders, digestive disorders, mental disorders and cardiovascular diseases. The prognosis of work ability for 2-year period was negatively related to mental disorders, neurological and sensory organ diseases, age and positively with mental resources.

## DISCUSSION

Good work ability prevailed among the studied groups of teachers, and the mean value was comparable with data from other studies [9], besides slightly, but significantly lower in comparison to the matched groups of non-teacher professionals. The work ability of the aging teachers was slightly lower in comparison to younger ones, but, the percentage share of teachers with good work ability prevailed (44.8%), followed by moderate (34.1%) and excellent (15.8%). The percentage share of aging teachers with low work ability was low (5.3%), indicating that the studied group of teachers would be able to continue to perform the job tasks.

It is known that one of the main determinants of work ability is health [15]. About 80% of both aging teachers and non-teacher professionals reported diseases diagnosed by physicians. Cardiovascular diseases and musculoskeletal disorders were the most frequently reported by the aging teachers and non-teaching professionals, followed by respiratory diseases, while teachers  $\leq 44$  years old reported respiratory diseases, cardiovascular diseases and neurological and sensory diseases. The work ability in relation to job demands in the studied teachers was predicted by mental resources, the estimated score for the number of diagnosed diseases and neurological and sensory organ diseases, while the estimated work ability impairment due to disease was related to musculoskeletal disorders, digestive disorders, mental disorders and cardiovascular diseases.

Our data also shows significantly higher rates of diseases with psychosomatic origin in the case of aging teachers, such as arterial hypertension, slight mental disorders and problems as slight depression, tension, anxiety, insom-

nia and diabetes, in comparison to aging non-teacher professionals, that could be related to contribution of long term work under stress at work [3,4]. In a previous study 20 years ago very high levels of stress in teachers were found [20], which were confirmed with physiological indices as the levels of stress hormones [23]. The proposed and implemented actions for stress control and training of teachers for coping with stress were successful and the recent study showed no such high levels of stress, but the past exposures to high levels of stress of aging teachers could contribute to higher rates of cardiovascular diseases along with variety other factors. Complex interactions were recently proposed between aging of working populations and life style risk factors such as low-level physical activity during leisure time, known to enhance the risk of cardiovascular diseases, and the work-related factors [24]. Our data is also in accordance with recently reported higher rates of mental disorders amongst teachers in several studies [2,7,25], the last study [25] pointing to the effort-reward-ratio, physical complaints and personal factors as having considerable influence on mental health in the case of teachers. Kovess-Masfety et al. [6] failed to find a higher risk for mental disorders amongst teachers, but reported a higher risk of some physical health conditions, like higher lifetime prevalence of rhinopharyngitis/laryngitis in both genders of teachers. Our data showed higher rates of repeated infections of respiratory tracts of both age groups of teachers, higher for aging teachers, with significantly higher rates in comparison to aging non-teacher professionals. This could be due to indoor air quality and contact with ill children. In this study more than 45% of the teachers complained about the quality of indoor air [20], and with the age the rates of chronic bronchitis and chronic sinusitis increased in the case of teachers. One of the gaps of our study is that it did not face the voice problems of teachers, shown in earlier studies [9,10], but our data indicates other work-related health conditions, such as hearing problems or hearing impairment, which

were more common among the teachers in comparison to other professionals, with significantly higher rates in the case of aging teachers in comparison to aging non-teacher professionals. And it is in accordance with the complaints about working conditions, more than 70% of the studied teachers complained about noisy work environment, but with the understanding that children are noisy.

Besides the rate of musculoskeletal disorders was slightly higher in the case of non-teacher professionals, 32.8% of the studied group of aging teachers pointed to diagnosed musculoskeletal disorder, and it is in accordance with earlier review [8] showing high rates of musculoskeletal disorders among teachers.

A half of the aging subjects of both groups and more than 60% of the subjects from younger groups considered no hindrance of estimated work ability due to diseases, but in the rest of the participants in the study the illnesses caused some symptoms or slowed down the pace of work, significantly with aging in the teachers, but no significant differences of sick leave absence were found comparing younger/aging teachers as well as teachers/non-teaching professionals. Nearly a half of both aging and younger teachers, as well as non-teacher professionals, reported that they had not been off work because of sick leave during the last year. In all studied groups the sick absences of no longer than 9 days prevailed, while the rate of long term sickness absences was low. Furthermore, slight but significant differences in the 2-year prognosis of work ability emerged, showing that the aging teachers were less optimistic compared both to younger teacher and aging non-teacher professionals, consistent with the results of other studies [12]. The regression analyses confirmed this finding showing that the prognosis of work ability for the 2-year period was negatively related to mental disorders, neurological and sensory organ diseases, age and positively with mental resources.

Four WAI scales were found to be age-dependent: work ability in comparison to lifetime best, the current diseases diagnosed by physician, the estimated work ability impair-

ment due to disease and own prognosis of work ability for the 2-year period. The consistent actions for prevention of teacher health deterioration, especially psychosomatic diseases, but also respiratory and sensory diseases and musculoskeletal disorders could contribute to maintenance of their work ability and retention of aging teachers in the labor market [26,27].

## CONCLUSIONS

Our data shows high work ability for both age groups of teachers, but significantly lower for aging teachers accompanied with higher rates of psychosomatic diseases, but also hearing impairment, respiratory diseases and musculoskeletal disorders. Perceived work ability in relation to job demands and the prognosis for work ability for the 2-year period of teachers were associated with mental resources and health conditions, especially the diseases with psychosomatic origin. Measures to improve prevention of teacher's health deterioration are needed, which could contribute to maintenance their health and work ability and retention of aging teachers in the labor market.

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