



# What is the level of back pain and dyspnoea among teachers after the COVID-19 pandemic?

Jaki jest poziom dolegliwości bólowych kręgosłupa i duszności wśród nauczycieli po pandemii COVID-19?

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## Abstract

**Introduction and Objective.** During the COVID-19 pandemic, both back pain and dyspnoea were symptoms that have been intensively studied by researchers as factors that could affect daily functioning. Education is one of the sectors of society most affected by the pandemic. The aim of the study was to assess the levels of dyspnoea and back pain in teachers in Poland and the United Kingdom in the first year after the end of the COVID-19 pandemic.

**Materials and Method.** An online survey was conducted among 410 teachers in Poland and the United Kingdom. The degree of spinal disability was assessed using the ODI and NDI questionnaires, and the level of dyspnoea was assessed using the MRC scale.

**Results.** Back pain was present in less than half of the teachers surveyed. There were no statistically significant differences in the level of pain complaints between male teachers from Poland and the United Kingdom, while in the female group significantly more severe pain complaints were found in the teachers from Poland. Polish female teachers reported higher levels of dyspnoea. Dyspnoea is associated with the level of pain. Measures of pain or dyspnoea increase with age.

**Conclusions.** In view of the results obtained, there is an urgent need to develop effective strategies to prevent back pain among teachers in Poland and the United Kingdom, and to improve working conditions. Dyspnoea is not a massive problem in the teacher population in Poland and the United Kingdom.

## Key words

neck pain, human health, low back pain, dyspnoea, COVID-19

## Streszczenie

**Wprowadzenie i cel pracy.** Podczas pandemii COVID-19 zarówno dolegliwości bólowe kręgosłupa, jak i duszność były objawami intensywnie badanymi przez badaczy jako czynniki mogące wpływać na codzienne funkcjonowanie. Edukacja to jeden z sektorów społeczeństwa najbardziej dotkniętych pandemią. Celem badania była ocena nasilenia duszności i bólu pleców u nauczycieli w Polsce i Wielkiej Brytanii w pierwszym roku po zakończeniu pandemii COVID-19.

**Materiał i metody.** Ankietę internetową przeprowadzono wśród 410 nauczycieli w Polsce i Wielkiej Brytanii. Autorzy oceniali stopień niepełnosprawności kręgosłupa za pomocą kwestionariuszy ODI i NDI oraz stopień duszności – za pomocą skali MRC.

**Wyniki.** Dolegliwości bólowe kręgosłupa występowały u mniej niż połowy ankietowanych nauczycieli. Nie stwierdzono istotnych statystycznie różnic w poziomie dolegliwości bólowych pomiędzy pedagogami z Polski i Wielkiej Brytanii, natomiast w grupie kobiet stwierdzono istotnie większe dolegliwości bólowe u nauczycielek z Polski. Polskie nauczycielki zgłaszały wyższy poziom duszności. Duszność jest powiązana z poziomem bólu. Nasilenie bólu lub duszności zwiększa się wraz z wiekiem.

**Wnioski.** W świetle uzyskanych wyników istnieje pilna potrzeba opracowania skutecznych strategii zapobiegania dolegliwościom bólowym kręgosłupa wśród nauczycieli w Polsce i Wielkiej Brytanii oraz poprawy warunków pracy. Duszność nie jest masowym problemem wśród nauczycieli w Polsce i Wielkiej Brytanii.

## Słowa kluczowe

zdrowie publiczne, duszność, bóle krzyża, COVID-19, bóle szyi

## INTRODUCTION

In May 2023, the World Health Organization (WHO) officially declared the end of the COVID-19 pandemic, meaning that it no longer poses a worldwide threat to public health. There

is growing evidence that although the negative impact of the pandemic has affected the economic and social spheres, it has had the greatest impact on health and the psyche, not only of those who have survived and overcome the disease, but also of healthy people. In many cases, their quality of life and daily functioning are impaired [1].

Spinal disorders and related conditions are among the most common ailments, affecting about 70–80% of the population, and in about 15% of cases prevent people from working.

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Musculoskeletal disorders of the spine are often the result of long-term, concurrent effects of the work environment, factors related to non-work life, as well as gender, age, length of occupation or physical fitness characteristics. They have become one of the leading public health problems for people worldwide, including teachers. Teachers, the vast majority of whom in Europe are women, are exposed on a daily basis to inappropriate postures, excessive strain on the spine through prolonged standing [2].

In recent years, the shift to distance learning has additionally increased the workload of teachers, requiring them to spend additional hours often in forced, non-ergonomic body positions. This has led to changes in behaviour and habits, which could have consequences for physical health, including the onset of musculoskeletal disorders and back pain [3].

The occurrence of dyspnoea is one of the factors contributing to a reduced health-related quality of life [4], generally described by patients as shortness of breath [5], and occurs quite frequently as an unpleasant symptom in people struggling with respiratory diseases. It can occur either at rest or during low exertion. In healthy people, on the other hand, it tends to be considered a normal response to physical exertion. Although it is a fairly common phenomenon, there are few studies in the literature describing dyspnoea in the general population. In research conducted by the authors in 2021, dyspnoea was most common in patients with severe COVID-19, and the prevalence of dyspnoea in the study population of patients with COVID-19 was low (34% respondents presented with dyspnoea with a score of 1 or higher). [6].

During the COVID-19 pandemic, both back pain and dyspnoea were symptoms that have been intensively studied by researchers as factors that could affect daily functioning. Education is one of the sectors of society most affected by the pandemic. Along with healthcare professionals, teachers are the largest group affected by the changes introduced by countries worldwide to limit the impact of the spread of the coronavirus [7].

The main aim of the study was to assess the severity of shortness of breath and spine pain among teachers in Poland and the United Kingdom (UK) in the first year after the end of the COVID-19 pandemic.

## MATERIALS AND METHOD

**Participants and procedure.** In the first half of September 2023, the authors conducted an online cross-sectional survey of Polish and UK teachers. The extent of cervical and lumbar back pain and dyspnoea was assessed using a Google Forms online questionnaire. A link to the questionnaire was distributed to teacher groups via social media. They were informed about the purpose of the survey, which was voluntary and anonymous. Consent to participate in the study was also included. Each of the questions on the form was mandatory to answer. Inclusion criteria for the study were: working as a teacher, having COVID-19 during the pandemic, living in Poland or the UK. Exclusion criteria were: musculoskeletal disorders, trauma, cardiovascular disease unrelated to COVID-19, history of chronic respiratory disease unrelated to COVID-19. The authors received approval for the study from the Senate Commission on Research Ethics of the .....

## METHODS OF ASSESSING THE LEVEL OF DYSPNOEA AND BACK PAIN

**Oswestry Disability Index, Neck Disability Index.** Spinal disability was assessed using the Neck Disability Index (NDI) questionnaires for cervical spine problems, and the Oswestry Disability Index (ODI) for lumbar spine problems. Each scale contains 10 questions and the answers are scored 0–5. A maximum of 50 points can be scored by the patient. The scale scores are interpreted as follows:

- none – 0–4;
- small – 5–14 points;
- average – 15–24 points;
- serious – 25–34 points;
- total – more than 35 points.

The Cronbach's alpha value for ODI and NDI is >0.7 [8].

**Medical Research Council Dyspnoea Scale.** The severity of dyspnoea (MRC) was assessed using the National Board of Physiotherapists recommended scale for the treatment and rehabilitation of patients after exercise COVID-19. The questionnaire contains 5 questions, each rated on a scale of 0–4, with 0 representing dyspnoea on exertion and 4 representing dyspnoea at rest [9]. The Cronbach's alpha value for the MRC is >0.7 [10].

**Statistical Methods.** Descriptive statistics were used in the study: mean with 95% confidence interval, median, standard deviation and skewness coefficient. Spearman's rank correlation coefficient was used for the correlation analysis. The Mann–Whitney test was used to investigate the relationship between dyspnoea, back pain, gender and country. A significance level of  $p < 0.05$  was adopted (\*). The results for  $p < 0.01$  (\*\*) and  $p < 0.001$  (\*\*\*) were additionally marked. Statistica v. 13 software (TIBCO Software Inc., Palo Alto, CA, USA [2017]) was used for the statistical analysis.

## RESULTS

**Characteristics of sample population.** The analysis concerns 410 people employed in the teaching profession, including 207 (147 women and 60 men) from Poland and 203 (146 women and 57 men) from the UK. Both populations are comparable in terms of age (Tab. 1) and gender distribution. The respondents worked in a variety of settings, from kindergarten to university (Tab. 2).

**Table 1.** Age of respondents

	Poland					United Kingdom				
	Mean	Median	Std. dev.	Min.	Max.	Mean	Median	Std. dev.	Min.	Max.
Age (years)	38.8	39	6.9	24	59	38.3	38	6.3	24	56

**Pain complaints.** Back pain (ODI and NDI measures) was present in less than half of the teachers surveyed. This makes it difficult to analyze the ODI and NDI because, with such a high skewness, the medians are equal to zero and comparisons must be based on the mean value. There were no statistically significant differences in the level of pain complaints between

**Table 2.** Place of work of respondents

Place of work	Poland	United Kingdom
kindergarten	25 (12.1%)	29 (14.3%)
primary school	71 (34.3%)	28 (13.8%)
special school	29 (14.0%)	24 (11.8%)
vocational school	13 (6.3%)	13 (6.4%)
technical college	20 (9.7%)	26 (12.8%)
high school	30 (14.5%)	49 (24.1%)
college	19 (9.2%)	34 (16.7%)

male teachers from Poland and the UK, while in the female group, significantly more severe pain complaints were found in female teachers from Poland (Tab. 3).

**Table 3.** Spinal pain complaints

Gender	Measures of pain	Poland (N = 147)			United Kingdom (N = 106)			p
		Mean	Median	IQR	Mean	Median	IQR	
women	ODI	3.8	0	8.0	2.6	0	5.0	0.0069**
	NDI	5.1	4	10.0	3.4	0	9.0	0.0007***
men	ODI	2.7	0	4.0	2.9	0	4.0	0.9588
	NDI	3.1	0	4.0	3.0	0	4.0	0.9718

IQR – inter-quartile range; p value calculated using Mann-Whitney test; p < 0.01 (\*\*); p < 0.001 (\*\*\*)

**Level of dyspnoea.** The extent of dyspnoea was measured with a fairly narrow scale (1–5 points) (Tab. 4) and an assessment made of the differences between Polish and British teachers (Tab. 5). A breakdown by gender was also provided, as in the previous analysis. A difference was found between the Polish and UK populations, but only in the female group – Polish female teachers reported higher levels of dyspnoea. No such differences were found in the male group. In addition, information on the exact distribution of the extent of dyspnoea in the communities studied is included. Only in the case of Polish female teachers, less than half of the respondents state that they have no problems with dyspnoea.

**Table 4.** Dyspnoea – descriptive statistics

Gender	Shortness of breath	Poland (N = 147)			United Kingdom (N = 106)			p
		Mean	Median	IQR	Mean	Median	IQR	
women	MRC	0.7	0.5	1.0	0.5	0.0	0.5	0.0204*
	MRC	0.4	0.0	0.5	0.4	0.0	0.5	0.9588

IQR – inter-quartile range; p value calculated using Mann-Whitney test; p < 0.05 (\*)

**Table 5.** Differences in levels of dyspnoea between Polish and UK teachers

MRC	Females				Males			
	Poland		United Kingdom		Poland		United Kingdom	
	N	%	N	%	N	%	N	%
0	63	42.9%	81	55.5%	39	65.0%	37	64.9%
0.5	38	25.9%	34	23.3%	8	13.3%	7	12.3%
1	23	15.6%	16	11.0%	10	16.7%	10	17.5%
2	15	10.2%	10	6.8%	2	3.3%	1	1.8%
3	6	4.1%	4	2.7%	1	1.7%	2	3.5%
4	2	1.4%	1	0.7%	0	0.0%	0	0.0%

MRC – Medical Research Council

**Pain and dyspnoea.** It was investigated whether the severity of pain was in any way related to the degree of dyspnoea (Tab. 6). The analysis was performed separately for the Polish and the British populations. There were statistically significant correlations in almost all groups. A positive sign of the correlation coefficient means that dyspnoea was associated with the level of pain – this may be due to a generally poorer health and lifestyle.

**Table 6.** Spearman's correlation coefficient between pain intensity and dyspnoea level (with assessment of statistical significance)

Correlated measures	Poland	
	Females	Males
MRC vs ODI	0,31 (p = 0,0002***)	0,17 (p = 0,1950)
MRC vs NDI	0,32 (p = 0,0001***)	0,30 (p = 0,0207*)
United Kingdom		
MRC vs ODI	0,41 (p = 0,0000***)	0,48 (p = 0,0002***)
MRC vs NDI	0,32 (p = 0,0001***)	0,45 (p = 0,0004***)

p < 0.05 (\*); p < 0.001 (\*\*); p < 0.0001 (\*\*\*)

**Age and the measures analyzed.** Measures of pain and dyspnoea increased with age (Tab. 7). This poses a problem because the correlations between these measures may be partially or even completely obvious, simply meaning that relatively older people are more likely to suffer from both types of these complaints.

**Table 7.** Correlations between age, back pain and dyspnoea

Measures	Poland		United Kingdom	
	Females	Males	Females	Males
	Age (years)			
ODI	0,49 (p = 0,0000***)	0,31 (p = 0,0150*)	0,46 (p = 0,0000***)	0,45 (p = 0,0004***)
NDI	0,47 (p = 0,0000***)	0,24 (p = 0,0632)	0,37 (p = 0,0000***)	0,31 (p = 0,0172*)
MRC	0,30 (p = 0,0003***)	0,18 (p = 0,1688)	0,29 (p = 0,0005***)	0,39 (p = 0,0029**)

p < 0.05 (\*); p < 0.01 (\*\*); p < 0.001 (\*\*\*)

## DISCUSSION

Back pain is a major global public health concern as well as a major social and economic issue. Significantly, it is more common in teachers compared with other occupational groups, with prevalence rates ranging from 12–95% [11]. The differences in the prevalence of back pain are thought to be due to the lack of postural control that teachers' work provides [12]. Back pain was a prevalent complaint in the study group, although it occurred in less than half of the teachers surveyed, with cervical spine complaints being more common. Cervical spine pain in teachers is often the result of unfavourable psychosocial conditions, and reported more frequently than in other professions (most likely related to emotional demands and workload) [13].

A review of the literature indicates that socio-demographic factors, such as age, gender, work experience and lifestyle, are risk factors associated with the prevalence of back pain in teachers [14].

There is evidence in the literature that working hours spent in repetitive activities, such as teaching or office work related

to the preparation of documents or teaching aids, increase the prevalence of back pain [15]. This is confirmed by the current study which found no statistically significant differences in the level of pain complaints between male teachers from Poland and the UK, while in the female group, significantly greater pain complaints were experienced by female teachers from Poland. A higher prevalence of back problems among female teachers compared to male teachers has also been observed in other studies [16]. Women are disproportionately affected by back pain syndromes, and this is true for all age groups [17]. According to the literature, the severity of pain complaints increases with age in both the Polish and British study groups.

Dyspnoea is a complex symptom that can result from the interaction of many factors e.g. physiological, psychological, social and environmental [18]. In this study, a difference was found between the Polish and British populations, but only in the female group – Polish female teachers reported higher levels of dyspnoea. No such differences were found in the male group. This is not surprising, as the female gender is predisposed to developing dyspnoea more frequently [19]. However, the authors are not able to explain the reason for the discrepancy between the results of different countries. Most likely, other factors play a role in influencing the results. Measures of dyspnoea (as well as pain complaints) increase with age, which is in line with reports from the literature [20].

**Limitations and strengths of the study.** The authors are aware that the presented study has limitations. The first is the inability to provide causal evidence for the observed relationships due to the cross-sectional nature of the study. The second limitation was the use of subjective methods to measure levels of back pain and fatigue. The authors observed that individuals with higher levels of dyspnoea had an increased risk of developing back pain. This is not a very strong relationship (correlation coefficients do not exceed 0.50), but it is worth noting. There is also the possibility that the correlations of ODI and NDI with MRC are apparent, caused by the appearance of these complaints with age. Therefore, it is not possible to conclude unequivocally from the analyses presented in this article, that the presence of dyspnoea increases the risk of back pain (and *vice versa*). Another limitation was the small sample size and online character of the study. Moreover, the authors did not assess the representativeness of the sample, nor did they attempt to standardize the obtained sample to the real population under study. Despite these limitations, however, the study also has strengths, such as increasing knowledge of back pain and dyspnoea among teachers in the first year after the COVID-19 pandemic in Poland and the United Kingdom. The authors also include among the strengths the use of standardized instruments, the low cost of conducting the study, and the lack of problems in obtaining a study group.

## CONCLUSIONS

In view of the results obtained, there is an urgent need to develop effective strategies to prevent back pain among teachers in Poland and the UK, and to improve working conditions. Care should be taken to ensure that teachers are trained in back pain prevention and ergonomics, and that their supervisors implement all possible preventive, control and therapeutic measures. Dyspnoea is not a massive problem in the teacher population in Poland and the UK.

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