



Assessment of perceived stress levels among professionally active patients with spinal pain undergoing rehabilitation at an occupational medicine centre – a pilot study

Tomasz Wójcik^{1,A-E}, Marek Grabski^{1,C,E-F}, Agnieszka Strzelecka^{1,B-C}, Roman Starz^{2,B,D}, Jarosław Chmielewski^{3,B-E}, Agnieszka Buczaj^{4,B-D}, Maria Pąchalska^{5,C,E-F}

¹ Collegium Medicum, Faculty of Health Sciences, Jan Kochanowski University, Kielce, Poland

² Faculty of Humanities, Jan Kochanowski University, Kielce, Poland

³ Faculty of Health Sciences, Cardinal Stefan Wyszyński University, Warsaw, Poland

⁴ Department of Technology Fundamentals, University of Life Sciences, Lublin, Poland

⁵ Chair of Neuropsychology and Neurorehabilitation, Andrzej Frycz Modrzewski University, Kraków, Poland

A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of the article

Wójcik T, Grabski M, Strzelecka A, Starz R, Chmielewski J, Buczaj A, Pąchalska M. Assessment of perceived stress levels among professionally active patients with spinal pain undergoing rehabilitation at an occupational medicine centre – a pilot study. *Ann Agric Environ Med*. doi:10.26444/aaem/241523

Abstract

Introduction and Objective. Spinal pain is common among professionally active people, and stress may be associated with pain severity and functional limitations. The aim of the study is to assess perceived stress and its associations with pain severity, functional disability, age, BMI, and broad occupational categories in patients undergoing rehabilitation for spinal pain.

Materials and Method. This pilot cross-sectional study included 166 patients undergoing rehabilitation at the Provincial Occupational Medicine Centre in Kielce (133 women, 33 men; age 28–65 years). PSS-10, Laitinen scale, ODI, and NDI were used. Analyses included the Mann–Whitney U, χ^2 , Kruskal–Wallis, and Spearman's rho tests. The Benjamini–Hochberg correction was applied to nine correlations.

Results. The mean PSS-10 score was 18.81 ± 6.67 (95% CI: 17.78–19.83), and the median sten score was 6 (Q1–Q3: 5–8). Work type did not differentiate stress ($p=0.913$). Before correction, PSS correlated with the Laitinen score ($\rho=0.156$; $p=0.045$) and NDI ($\rho=0.266$; $p=0.001$). After correction, only the PSS–NDI association remained significant ($q=0.005$), including among women ($\rho=0.282$; $q=0.005$).

Conclusions. Perceived stress was average in this single-centre rehabilitation sample. The PSS–NDI relationship was the only association that remained significant after correction. Given the pilot cross-sectional design and unequal subgroup sizes, the findings are exploratory and require confirmation in larger studies.

Key words

stress, psychological, back pain, musculoskeletal pain, occupational health, pilot projects

INTRODUCTION AND OBJECTIVE

Musculoskeletal pain, including spinal pain, is one of the most common health problems worldwide and is associated with poorer quality of life, limitations in daily functioning, and a substantial burden on healthcare systems and the economy [1, 2]. The lifetime prevalence of low back pain in the general population is estimated at 60–80% [3–5]. Neck and back pain may limit occupational activity and contribute to absence through sickness [6]. The social and rehabilitative significance of lumbosacral pain is also supported by studies of patients undergoing preventive physiotherapy [7].

Spinal pain among professionally active individuals has a multifactorial aetiology involving biomechanical, ergonomic, and psychosocial factors [8]. In a study of professionally active

physiotherapists, spinal complaints were among the most frequently reported work-related problems, underscoring the role of occupational exposure in the development of musculoskeletal disorders [9]. Severe or prolonged stressors may activate the hypothalamic–pituitary–adrenal axis, affect cortisol and catecholamine secretion, and modulate the inflammatory response, thereby influencing muscle tension, pain threshold, and pain modulation mechanisms [10–12]. Chronic stress responses may also promote oxidative stress, which is involved in cellular and tissue damage [13].

Available studies indicate a bidirectional relationship between stress and pain: higher stress levels may coexist with greater severity and persistence of pain, whereas persistent pain may increase psychological burden [14–16]. Particularly relevant to the present study are findings from professionally active women, in whom the frequency of perceived stress was significantly associated with both neck pain intensity and Neck Disability Index scores [17]. This supports the inclusion of psychosocial factors in the assessment of professionally active individuals reporting spinal pain.

✉ Address for correspondence: Agnieszka Buczaj, Department of Technology Fundamentals, University of Life Sciences, Lublin, Poland
E-mail: agnieszka.buczaj@up.lublin.pl

Received: 04.07.2026; accepted: 07.10.2026; first published: 21.10.2026

The aim of the study was to assess perceived stress levels among professionally active patients reporting spinal pain and undergoing rehabilitation at the Provincial Occupational Medicine Centre in Kielce, and to explore associations between stress and pain severity, functional disability, age, BMI, and the broad categories of predominant work recorded in the study. Analyses involving gender and pain location were treated as descriptive or exploratory.

MATERIALS AND METHOD

The study was considered a pilot because it was conducted in a single centre in a relatively small, selected rehabilitation sample, and was intended to provide preliminary estimates and identify issues to be addressed in a larger study. Eligibility was based on professional activity, current rehabilitation at the study centre, and reported pain in the lumbosacral (L-S) or cervicothoracic (C-Th) spinal region. Exclusion criteria were: specific spinal pathology, spinal pain lasting less than three months, coexisting chronic pain syndromes, cognitive impairment preventing reliable completion of the questionnaires, pregnancy, and incomplete questionnaire data precluding statistical analysis. For the pain-location analysis, each participant was assigned to one of two mutually exclusive categories: lumbosacral (L-S) or cervicothoracic (C-Th). If pain was reported in more than one spinal region, classification was based on the reported predominant pain location.

Perceived stress was assessed using the Perceived Stress Scale (PSS-10). The instrument comprises 10 items referring to the subjective assessment of stress during the previous month; the raw score ranges from 0–40 points and may be converted to sten scores. Sten scores of 1–4 are interpreted as low, 5–6 as average, and 7–10 as high.

Pain severity was assessed using the Laitinen scale, in which pain intensity, pain frequency, analgesic use, and limitation of physical activity are each scored from 0–4 points (total score 0–16, higher scores indicating greater pain severity) [18]. Pain-related functional disability was assessed using the Neck Disability Index (NDI) and Oswestry Disability Index (ODI). Both the ODI and the NDI were completed by all participants, irrespective of the reported predominant pain location. The NDI was used to assess disability related to the cervical spine, whereas the ODI assessed disability related to the lumbar spine. Therefore, analyses involving ODI and NDI were performed for the entire study sample and, additionally, in gender-stratified analyses.

Information on the predominant type of work was obtained by participant self-report and classified into four broad categories: office work, physical work, teacher, and healthcare worker.

Statistical analysis was performed using STATISTICA PL 13.1. Quantitative variables were presented as mean and standard deviation or median and quartiles, as appropriate to the characteristics of the variable. Differences between women and men for quantitative data were assessed using the Mann–Whitney U test, the association between gender and pain location using the χ^2 test, and differences in stress levels among categories of work type using the Kruskal–Wallis test. Associations between PSS sten scores and Laitinen, ODI and NDI scores, as well as age and BMI, were assessed using Spearman’s rho correlation coefficient; additional PSS–

ODI and PSS–NDI analyses were conducted separately for women and men. For the association between gender and pain location, Cramér’s V, prevalence ratio (PR), and odds ratio (OR) with 95% confidence intervals were calculated. A 95% CI for the mean raw PSS-10 score was estimated using the Student’s t distribution, and approximate 95% CIs for Spearman’s rho were calculated using Fisher’s z transformation. The Benjamini–Hochberg correction was applied to nine correlation analyses to control the false discovery rate (FDR); $q < 0.05$ was considered significant after correction. For the remaining analyses, statistical significance was set at $p < 0.05$. Because this was a pilot study and the available dataset was analysed primarily with univariable/non-parametric methods, no multivariable model was fitted. Accordingly, the observed correlations cannot be interpreted as independent of potential confounding.

RESULTS

The analysis included 166 participants: 133 women (80.1%) and 33 men (19.9%), mean age – 50.05 ± 8.08 years for women, 49.48 ± 10.29 years for men; the difference was not statistically significant ($p = 0.984$). Body weight and height were significantly greater in men ($p < 0.001$). Mean BMI was 26.35 ± 5.44 kg/m² in women and 27.28 ± 3.83 kg/m² in men; the difference was not statistically significant ($p = 0.125$) (Tab. 1).

Table 1. Characteristics of the study group (N=166)

Variable	Women (n=133), M±SD	Range	Men (n=33), M±SD	Range	p
Age (years)	50.05±8.08	28–64	49.48±10.29	29–65	0.984
Body weight (kg)	70.98±14.45	45–120	86.61±12.72	62–115	<0.001
Height (m)	1.64±0.06	1.51–1.83	1.78±0.07	1.64–1.99	<0.001
BMI (kg/m ²)	26.35±5.44	17.36–45.61	27.28±3.83	22.04–39.79	0.125

Mann–Whitney U test; significance level $p < 0.05$

Pain location was significantly associated with gender ($\chi^2 = 8.24$; $p = 0.004$; Cramér’s $V = 0.223$). In the overall sample, 94 participants (56.6%) reported L-S pain and 72 (43.4%) reported C-Th pain. Among women, the frequencies of the two locations were similar, whereas L-S pain predominated among men. The prevalence of L-S pain was 1.54 times higher in men than in women (PR=1.54; 95% CI: 1.21–1.96), with an odds ratio of 3.55 (95% CI: 1.44–8.74) (Tab. 2).

Table 2. Pain location by gender

Pain location	Women n (%)	Men n (%)	Overall n (%)
L-S	68 (51.1)	26 (78.8)	94 (56.6)
C-Th	65 (48.9)	7 (21.2)	72 (43.4)

$\chi^2 = 8.24$; $p = 0.004$; Cramér’s $V = 0.223$.

The mean raw PSS-10 score was 18.81 ± 6.67 points (95% CI: 17.78–19.83), with a median of 19 (Q1–Q3: 14–23). The mean sten score was 6.25 ± 1.93 , with a median of 6 (Q1–Q3: 5–8), corresponding to an average level of perceived stress (Tab. 3).

The predominant type of work was distributed as follows: office work – 103 participants (62.0%), physical work – 31 (18.7%), teachers – 14 (8.4%), and healthcare workers –

Table 3. Perceived Stress Scale (PSS-10) results in the study group (N=166)

Measure	Mean±SD	95% CI of the mean	Median	Q1–Q3	Range
PSS-10 – raw score	18.81±6.67	17.78–19.83	19	14–23	0–34
PSS – sten score	6.25±1.93	—	6	5–8	—

18 (10.8%). No significant differences in perceived stress levels were found among these groups ($H=0.527$; $p=0.913$) (Tab. 4). These four self-reported categories should be regarded as a pragmatic, heterogeneous classification rather than as equivalent measures of occupational exposure; the markedly unequal group sizes further limit inference from this comparison.

Table 4. Predominant type of work and perceived stress level

Type of work	n	%	Sum of ranks	Mean rank
Office work	103	62.0	8476.0	82.29
Physical work	31	18.7	2577.0	83.13
Teacher	14	8.4	1168.5	83.46
Healthcare	18	10.8	1639.5	91.08

Kruskal–Wallis test: $H(3, N=166)=0.527$; $p=0.91$

Before correction for multiple comparisons, a weak positive correlation was found between stress level and the Laitinen scale score ($\rho=0.156$; 95% CI: 0.004–0.301; $p=0.045$; $q=0.101$), as well as NDI ($\rho=0.266$; 95% CI: 0.118–0.402; $p=0.001$; $q=0.005$). After the Benjamini–Hochberg correction, only the PSS–NDI association remained statistically significant. No significant associations were found between PSS sten scores and ODI, age, or BMI (Tab. 5).

Table 5. Associations between perceived stress level and selected variables in the overall sample (N=166)

Variable pairs	Spearman's rho	95% CI	t(N–2)	p	q (BH)
PSS vs Laitinen scale	0.156	0.004–0.301	2.017	0.045	0.101
PSS vs ODI	0.041	–0.112–0.192	0.523	0.602	0.774
PSS vs NDI	0.266	0.118–0.402	3.522	0.001	0.005
PSS vs age	–0.076	–0.226–0.077	–0.972	0.332	0.498
PSS vs BMI	0.012	–0.141–0.164	0.148	0.883	0.898

95% CI – confidence intervals for Spearman's rho; q – values after the Benjamini–Hochberg correction for nine 9 correlation analyses.

In gender-stratified analyses, a positive association between PSS and ODI was identified in men before correction ($\rho=0.354$; 95% CI: 0.012–0.622; $p=0.043$), but did not remain significant after FDR correction ($q=0.101$). The association between PSS and NDI in men was not significant. In women, no association was found between PSS and ODI; however, a positive correlation between PSS and NDI was observed ($\rho=0.282$; 95% CI: 0.117–0.432; $p=0.001$), which remained significant after the Benjamini–Hochberg correction ($q=0.005$) (Tab. 6). These gender-stratified findings are exploratory. A statistically significant association in one gender and a non-significant association in the other does not itself demonstrate a statistically significant difference between genders, because no formal interaction test was performed.

Table 6. Associations of PSS with ODI and NDI by gender

Variable pairs	Gender (n)	Spearman's rho	95% CI	t(N–2)	p	q (BH)
PSS vs ODI	Men (33)	0.354	0.012–0.622	2.106	0.043	0.101
PSS vs NDI	Men (33)	–0.287	–0.574–0.062	–1.667	0.106	0.191
PSS vs ODI	Women (133)	0.011	–0.160–0.181	0.128	0.898	0.898
PSS vs NDI	Women (133)	0.282	0.117–0.432	3.360	0.001	0.005

Subgroup analyses were exploratory because of the pilot nature of the study and unequal gender-group sizes. The q values refer to one family of nine correlation analyses presented in Tables 5 and 6. A graphical summary of Spearman's rho coefficients with 95% confidence intervals is presented in Figure 1. No inference on effect modification by gender was made

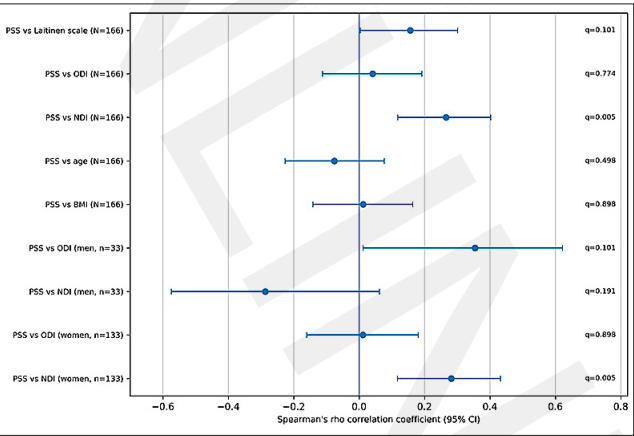


Figure 1. Associations between perceived stress (PSS) and selected variables in the overall sample and in gender-stratified analyses. Spearman's rho coefficients with 95% confidence intervals are shown. After the Benjamini–Hochberg correction, the PSS–NDI associations in the overall sample and among women remained significant ($q=0.005$)

DISCUSSION

In the study group of professionally active patients undergoing rehabilitation for spinal pain, the median PSS sten score was 6, corresponding to an average level of perceived stress. Before correction for multiple comparisons, weak positive associations were found between PSS and the Laitinen scale score and NDI. After application of the Benjamini–Hochberg correction, only the PSS–NDI association remained significant ($\rho=0.266$; $q=0.005$). The magnitude of this association was weak and its clinical relevance should therefore be interpreted cautiously. This result is consistent with previous observations on the co-occurrence of psychological stress and musculoskeletal pain [15–16]. Similar findings were reported by Czepińska et al., who found significant associations of stress frequency with neck pain intensity and NDI scores among women employed in horticulture [17]. Owing to the cross-sectional design, the observed associations did not permit inference regarding causal direction.

The absence of a significant association between PSS and ODI in the overall sample suggests that any relationship between stress and functional disability may vary according to clinical context. Both the ODI and the NDI were completed by all participants, irrespective of the reported predominant pain location; therefore, these analyses reflect region-specific self-reported functional limitations across the entire study sample rather than disability measures restricted to participants with pain predominantly located in the

corresponding spinal region. In gender-stratified analyses, the PSS–ODI correlation in men was significant only before FDR correction, whereas the PSS–NDI correlation in women remained significant after correction. These subgroup findings should be interpreted cautiously because of the marked imbalance in subgroup sizes. Importantly, statistical significance in one subgroup and absence of significance in another does not establish a difference between sexes; such a conclusion would require formal interaction testing, which was not performed.

No association was found between perceived stress and age or BMI. The lack of an association with age should be interpreted in the context of the characteristics of the study population. Tatala et al., analysing the relationship between stress and occupational burnout in nurses using the PSS-10, demonstrated a moderating role of age, suggesting that the importance of this variable may depend on the occupational environment and the health outcome analysed [19]. Makara-Studzińska et al. demonstrated the usefulness of the PSS-10 for assessing stress among professionally active women and an association between stress levels and selected demands of the work environment [20]. The lack of correlation with BMI in our study should be interpreted cautiously, because the PSS-10 refers to stress perceived during the previous month, whereas body weight results from the influence of multiple factors over a longer period.

The predominant type of work did not differentiate perceived stress levels. However, the four occupational categories were methodologically heterogeneous and markedly unequal in size (14–103 participants): ‘office work’ and ‘physical work’ primarily describe the nature of occupational workload, whereas ‘teacher’ and ‘healthcare worker’ identify specific occupational groups. Therefore, this analysis should be regarded as exploratory. Buczej et al. showed that musculoskeletal complaints among physiotherapists are associated with work characteristics and occupational loads [9], while Rębak et al., using the PSS-10 among surgical nurses, confirmed the importance of occupational stress for adverse psychophysical outcomes [21]. Future studies should use more precise measures of occupational exposure, including biomechanical load, constrained posture, working time, time pressure, psychological demands, and occupational autonomy.

The findings are consistent with the biopsychosocial model of pain, according to which the assessment of patients with musculoskeletal complaints should include not only somatic status but also functioning and psychological and environmental factors. In the study by Wiśniowska-Szurlej et al., the use of ICF-based tools in outpatient rehabilitation of patients with musculoskeletal conditions confirmed the importance of multidimensional assessment of functioning and quality of life [22]. In rehabilitation practice, psychosocial factors should therefore be considered alongside somatic and functional assessment. Within the fear-avoidance model, fear of movement and avoidance behaviours that lead to activity restriction may additionally contributed to pain persistence [23].

The broader context of the findings includes the potential consequences of persistent pain for psychological functioning. Population-based studies have demonstrated co-occurrence of pain with poorer mental health [24], whereas prolonged activation of adaptive systems is described in terms of allostatic load [25]. Symptoms of depression or

anxiety were not assessed in the present study; therefore, these relationships require verification in subsequent stages of the project.

Limitations of the study. The present study was a pilot study and its findings should be interpreted in the light of substantial design limitations. It included 166 professionally active patients with spinal pain undergoing rehabilitation at a single occupational medicine centre; therefore, the findings apply only to this selected clinical group and cannot be generalized to the broader population of professionally active individuals with spinal pain. The gender groups were markedly unequal (133 women and 33 men), therefore, gender-stratified analyses, particularly among men, are exploratory. The cross-sectional design permits identification of associations but does not establish causal direction. Although patients with spinal pain lasting less than three months were excluded, the study did not further differentiate chronic pain by duration or clinical course. Because both disability questionnaires were administered to all participants irrespective of the predominant pain location, the ODI and NDI results should be interpreted as region-specific self-reported functional limitations, rather than as measures restricted exclusively to participants whose predominant pain was located in the corresponding spinal region. The occupational categories were broad, heterogeneous, and highly unequal in size. Finally, no multivariable model was used, so the observed PSS–NDI association cannot be considered independent of potential confounders.

These pilot findings will be used to plan further research in a larger population. Among men, only seven participants reported cervico-thoracic (C-Th) pain as the predominant pain location; therefore, the gender-stratified PSS–NDI analysis in men should be interpreted with particular caution, despite the NDI having been completed by all male participants.

The pilot nature of the study and the findings obtained support continuation of the research in a larger and more diverse population. Future studies should use clearly predefined inclusion and exclusion criteria, record pain duration and coexisting pain locations, define scale-specific analytical samples prospectively, include more balanced comparison groups, and preferably adopt a multi-centre and prospective design. A larger sample would also allow multivariable modelling and formal interaction testing, as well as the prospective use of additional pain-intensity measures such as a Visual Analog Scale (VAS), which was not used in the present study.

CONCLUSIONS

- 1) In this selected single-centre rehabilitation sample, perceived stress was at an average level (median PSS sten score – 6).
- 2) The only association that remained statistically significant after correction for multiple comparisons was a weak positive correlation between PSS and NDI; because of the cross-sectional pilot design and methodological limitations, this finding should be regarded as exploratory rather than causal or clinically definitive.
- 3) The findings cannot be generalized beyond the studied group and support the need for further research in a larger,

more diverse, preferably multi-centre sample using clearer eligibility criteria, prospectively defined scale-specific analyses, and multivariable models.

REFERENCES

1. Ferreira ML, De Luca K, Haile LM, et al. Global, regional, and national burden of low back pain, 1990–2020, its attributable risk factors, and projections to 2050: a systematic analysis of the Global Burden of Disease Study 2021. *Lancet Rheumatol.* 2023;5(6):e316–e329. [https://doi.org/10.1016/S2665-9913\(23\)00098-X](https://doi.org/10.1016/S2665-9913(23)00098-X)
2. Korpela T, Karppinen J, Oura P, et al. Musculoskeletal Pain, Insomnia and Health-Related Quality of Life: Associations in the Middle-Aged General Population. *Eur J Pain.* 2026;30(1):e70197. <https://doi.org/10.1002/ejp.70197>
3. Cheng M, Xue Y, Cui M, et al. Global, Regional, and National Burden of Low Back Pain: Findings From the Global Burden of Disease Study 2021 and Projections to 2050. *Spine.* 2025;50(7):E128–E139. <https://doi.org/10.1097/BRS.00000000000005265>
4. Zhou T, Salman D, McGregor AH. Recent clinical practice guidelines for the management of low back pain: a global comparison. *BMC Musculoskelet Disord.* 2024;25(1):344. <https://doi.org/10.1186/s12891-024-07468-0>
5. Yang N, Di J, Wang W, et al. Global burden of low back pain from 1990 to 2021: a comprehensive analysis of risk factors and trends using the Global Burden of Disease Study 2021. *BMC Public Health.* 2025;25(1):1886. <https://doi.org/10.1186/s12889-025-23178-1>
6. Hartvigsen J, Hancock MJ, Kongsted A, et al. What low back pain is and why we need to pay attention. *Lancet.* 2018;391(10137):2356–2367. [https://doi.org/10.1016/S0140-6736\(18\)30480-X](https://doi.org/10.1016/S0140-6736(18)30480-X)
7. Grzegorzczak M, Waszak P, Lutek-Sitko A, et al. Lower back pain in the lumbosacral region of the spine as a social problem for patients attending preventive physiotherapy – a comparison of cohorts. *Ann Agric Environ Med.* 2025;32(1):122–126. <https://doi.org/10.26444/aaem/200305>
8. Roberts KE, Ferreira ML, Beckenkamp PR, et al. Global Trends in Risk Factors for Low Back Pain: An Analysis of the Global Burden of Disease Study Data From 1990 to 2021. *Arthritis Care Res (Hoboken).* 2025;77(7):837–847. <https://doi.org/10.1002/acr.25520>
9. Buczaj A, Pecyna A, Krzywicka M, et al. Analysis of work-related ailments affecting physiotherapists. *Ann Agric Environ Med.* 2024;31(3):417–425. <https://doi.org/10.26444/aaem/186214>
10. McEwen BS, Akil H. Revisiting the stress concept: implications for affective disorders. *J Neurosci.* 2020;40(1):12–21. <https://doi.org/10.1523/JNEUROSCI.0733-19.2019>
11. Slavich GM. Social Safety Theory: A Biologically Based Evolutionary Perspective on Life Stress, Health, and Behavior. *Annu Rev Clin Psychol.* 2020;16:265–295. <https://doi.org/10.1146/annurev-clinpsy-032816-045159>
12. Yariibeygi H, Panahi Y, Sahraei H, et al. The impact of stress on body function: a review. *EXCLI J.* 2017;16:1057–1072. <https://doi.org/10.17179/excli2017-480>
13. Sies H. Oxidative Stress: Concept and Some Practical Aspects. *Antioxidants (Basel).* 2020;9(9):852. <https://doi.org/10.3390/antiox9090852>
14. Timmers I, Quaedflieg CWEM, Hsu C, et al. The interaction between stress and chronic pain through the lens of threat learning. *Neurosci Biobehav Rev.* 2019;107:641–655. <https://doi.org/10.1016/j.neubiorev.2019.10.007>
15. Lunde CE, Sieberg CB. Walking the Tightrope: A Proposed Model of Chronic Pain and Stress. *Front Neurosci.* 2020;14:270. <https://doi.org/10.3389/fnins.2020.00270>
16. Generaal E, Vogelzangs N, Macfarlane GJ, et al. Biological Stress Systems, Adverse Life Events, and the Improvement of Chronic Multisite Musculoskeletal Pain Across a 6-Year Follow-Up. *J Pain.* 2017;18(2):155–165. <https://doi.org/10.1016/j.jpain.2016.10.010>
17. Czepińska A, Zawadka M, Wójcik-Żałuska A, et al. Association between pain intensity, neck disability index, and working conditions among women employed in horticulture. *Ann Agric Environ Med.* 2023;30(3):531–535. <https://doi.org/10.26444/aaem/162028>
18. Laitinen J. Acupuncture and transcutaneous electric stimulation in the treatment of chronic sacrolumbalgia and ischialgia. *Am J Chin Med.* 1976;4(2):169–175. <https://doi.org/10.1142/S0192415X76000214>
19. Tatala M, Wojtasiński M, Janowski K, et al. Perceived stress and burnout in nurses – the moderating role of age and network analysis perspective. *Ann Agric Environ Med.* 2025;32(1):85–97. <https://doi.org/10.26444/aaem/191048>
20. Makara-Studzińska M, Żałuski M, Kaczor-Szkodny PM, et al. Level of perceived stress among female emergency call operators during the first waves of the COVID-19 pandemic. *Ann Agric Environ Med.* 2024;31(4):572–578. <https://doi.org/10.26444/aaem/198883>
21. Rębak D, Uniejewska S, Chmielewski J, et al. Strategies for coping with stress, emotional control and occupational burnout among surgical nurses. *Ann Agric Environ Med.* 2024;31(4):473–478. <https://doi.org/10.26444/aaem/191821>
22. Wiśniowska-Szurlej A, Sozańska AB, Brożonowicz J, et al. Value of using the ICF Core Set for patients with Musculoskeletal Conditions in Outpatient Rehabilitation Facilities in South-Eastern Poland. *Ann Agric Environ Med.* 2024;31(4):579–587. <https://doi.org/10.26444/aaem/187408>
23. Vlaeyen JWS, Crombez G, Linton SJ. The fear-avoidance model of pain. *Pain.* 2016;157(8):1588–1589. <https://doi.org/10.1097/j.pain.0000000000000574>
24. Bondesson E, Larrosa Pardo F, Stigmar K, et al. Comorbidity between pain and mental illness – Evidence of a bidirectional relationship. *Eur J Pain.* 2018;22(7):1304–1311. <https://doi.org/10.1002/ejp.1218>
25. McEwen BS, Wingfield JC. What's in a name? Integrating homeostasis, allostasis and stress. *Horm Behav.* 2010;57(2):105–111. <https://doi.org/10.1016/j.yhbeh.2009.09.011>