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Psychological, clinical and socio-demographic predictors of pain catastrophizing in chronic pain patients: insights from a cross-sectional study

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Abstract. ***Background.*** *Considering the complexities surrounding chronic pain and its profound psychological impact, including the role of maladaptive pain beliefs like pain catastrophizing, it becomes essential to delve deeper into the factors contributing to this phenomenon. The aim was to study the characteristics of pain catastrophizing in the Ukrainian population of patients with chronic pain.* ***Materials and methods.*** *This research was a cross-sectional observational study involving 150 participants suffering from chronic pain who consented to take part. A set of socio-demographic and clinical characteristics, as well as the results of some psychological assessments, such as the Pain Catastrophizing Scale, Hospital Anxiety and Depression Scale, were used to study and describe the structure and correlates of pain catastrophizing in patients with chronic pain. To assess pain intensity, the visual analog scale was used.* ***Results.*** *The study identified significant associations between pain catastrophizing and various socio-demographic factors, with females exhibiting higher levels of rumination, magnification, and helplessness compared to males. Notably, marital status and financial stability were found to influence catastrophizing levels, while psychological factors, such as anxiety and depression, also demonstrated a strong correlation with pain catastrophizing. Additionally, poorer sleep quality and a higher number of pain localizations were linked to increased catastrophizing, highlighting the complexity of these interrelationships.* ***Conclusions.*** *These findings emphasize the need for early intervention strategies aimed at reducing pain catastrophizing among chronic pain patients to improve treatment outcomes. Future research should explore targeted management approaches that incorporate socio-demographic, clinical and psychological factors influencing pain catastrophizing to enhance therapeutic efficacy and patient quality of life.*

Keywords: *psychological, clinical, socio-demographic predictors; pain catastrophizing; chronic pain*

Introduction

Pain is an inherently negative perceptual and affective experience that acts as a warning system to protect the body from injury, unfolds over time and is influenced by myriad factors, making it highly dynamic [1]. Pain-related disorders are the leading cause of disability and disease burden worldwide, affecting between a third and half of the population globally, and chronic pain has been found to affect 4.8 % of adult population [2]. Arising from dysregulation of the balanced mechanisms that adaptively modulate pain signaling, chronic pain presents a major challenge for healthcare professionals and researchers [3]. High incidence of chronic pain leads to a high burden in adult population and the need for pain management [4].

Recent evidence suggests that individuals living with chronic pain demonstrate reduced tolerance of uncertainty compared to healthy individuals, and this often leads to excessive worry, which may be related not only to the tendency to catastrophize pain, but also to increased distress [5]. Findings suggest that the presence of chronic pain in adults is associated with significantly higher severity scores for anxiety and depression [6]. Co-occurrence of chronic pain and anxiety or depression symptoms makes achieving positive health outcomes for both conditions more chal-

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lenging; therefore, research should clarify the dynamics of their relations [7].

Maladaptive pain beliefs are central to the development and management of chronic pain, and one of the most important cognitive correlates of chronic pain intensity is pain catastrophizing, defined as the tendency to magnify the threat and interpretation of pain [8]. Pain catastrophizing may possibly be much more complex and can be the result of several interconnected psychosocial and biological processes and mechanisms [9]. It is thought to be one of the most robust predictors of adverse pain outcomes [10].

Pain catastrophizing can account for 7–31 % of the variance in pain perception depending on the type of pain and the characteristics of the population. Therefore, a comprehensive understanding of this phenomenon has the potential to enhance intervention strategies [11]. The biopsychosocial model may help facilitate the understanding of chronic pain and pave the road to improved outcomes and treatment for patients with chronic pain [12].

Considering the complexities surrounding chronic pain and its profound psychological impact, including the role of maladaptive pain beliefs like pain catastrophizing, it becomes essential to delve deeper into the factors contributing to this phenomenon. The high prevalence of chronic pain, along with its associations with anxiety, depression, and reduced tolerance for uncertainty, underscores the importance of understanding pain catastrophizing. Understanding these dynamics will contribute to improved interventions and management strategies for chronic pain in this specific demographic.

The purpose was to study psychological, clinical, and socio-demographic predictors of pain catastrophizing in the Ukrainian population of patients with chronic pain.

Materials and methods

This research was a cross-sectional observational study involving 150 participants suffering from chronic pain who consented to take part. The study enrolled adult outpatients aged 18 and above, all diagnosed with either primary or secondary chronic pain lasting more than three months, as defined by the ICD-11 criteria (the version in use in Ukraine during the study period). Patient recruitment took place at the Department of Medical Psychology, Psychosomatic Medicine and Psychotherapy between December 2023 and October 2024.

Inclusion criteria: 1) age from 18 to 70 years; 2) the presence of chronic pain that lasts more than three months; 3) written informed consent to participate in the study.

Exclusion criteria: 1) severe uncontrolled chronic noncommunicable diseases; 2) presence of severe cognitive impairment (< 20 points on the Mini-Mental State Examination); 3) established, suspected, or planned pregnancy at the time of the screening assessment; 4) lactation; 5) surgery planned at the time of the screening assessment; 6) severe or total disability.

Informed consent was obtained from all participants. The study procedures adhered to the principles of the Declaration of Helsinki. All data was collected anonymously.

Data collection. Demographic information gathered included participants' gender, age, education level, marital and financial status, employment status, and whether they lived in urban or rural areas. Data related to pain, such as the duration of the pain disorder, intensity of pain, underlying diagnosis causing the pain, and the number of affected body parts, were also collected. Additionally, comorbid conditions, history of traumatic brain injury (TBI), childhood traumatic experiences, current post-traumatic stress disorder (PTSD), physical activity levels, and sleep disorders were evaluated. PTSD, childhood trauma, and sleep disorders were diagnosed by a psychiatrist, while a neurologist assessed TBI history.

The Pain Catastrophizing Scale (PCS) was employed to evaluate catastrophic thinking in individuals suffering from chronic pain [13]. This self-administered questionnaire consists of 13 items designed to measure three key components of catastrophizing: rumination, magnification, and helplessness. Participants respond to each question using a 5-point Likert scale, where 0 indicates no catastrophizing and 5 represents the highest degree of catastrophizing. The scale includes 4 items (0–16 points) for rumination, 3 items (0–12 points) for magnification, and 6 items (0–24 points) for helplessness. The subscale for rumination contains 4 statements (0–16 points), for magnification — three (0–12 points), and for helplessness — 6 statements (0–24 points). Additionally, a total score was calculated, which was the sum of the scores for the individual items and ranged from 0 to 52.

The Hospital Anxiety and Depression Scale (HADS) was utilized to assess levels of anxiety and depression. This scale consists of 14 items, divided into two categories: the anxiety subscale (A) covering the odd-numbered questions (1, 3, 5, 7, 9, 11, 13), and the depression subscale (D) including the even-numbered ones (2, 4, 6, 8, 10, 12, 14). Each item offers four response choices, indicating the severity of symptoms, ranging from 0 points (no symptoms) to 3 points (severe symptoms). Scores from each subscale are summed up separately. Three clinical ranges are identified: 0–7 points indicate normal levels, 8–10 suggest mild anxiety or depression, and 11 or higher reflect clinically significant anxiety or depression [14].

To assess pain intensity, the visual analog scale (VAS) was used. This is a self-reported numerical rating scale where a patient is offered to evaluate their pain sensations ranging from 0 to 10. A patient marks the number that, in their opinion, most accurately reflects the strength of the pain sensation at the time of the examination [15].

Statistical analysis. The data was presented as mean and standard deviation (SD). A Bartlett's test was used to assess equality of variances. Cronbach's alpha [16] was calculated for PCS to assess its inner validity and reliability. For pairwise group comparison, Spearman's two-sided t-test for independent samples was used in case of equal variances, and Welch test was used in cases where variances were significantly different. One-way analysis of variance (ANOVA) was applied to assess difference between more than two groups. P-value of less than 0.05 was considered statistically significant.

Data was stored in Microsoft Excel 365, and Python programming language was used for data analysis and visualization.

Results

Participants had a mean age of 35.27 years (SD 13.17; range 20–67) with the majority being women (58.67 %). About half of the participants were single (46.67 %), whereas 41.33 % were married. The majority (86 %) had some educational degree, and about half of the participants (49.33 %) were satisfied with their financial status.

Females and males had significant difference in age (females were older), education (more males had higher education), marital status (more males were divorced), financial status (females were less satisfied with their income), physical activity (males more frequently were physically active), and no significant difference was found in a living area (Table 1).

The differences between males and females were found on the depression and anxiety severity (females had higher rates), duration of pain (females had longer pain), number of pain localizations (females frequently had more than two localizations, while males typically had only one), TBI history (rare even among females, yet more common in males), psychotraumatic experience in childhood (more frequent in females), PTSD diagnosis (more common in females), sleep disorders frequency (most females had one, while it was less common in males), and substance use disorders (most males noted frequent consumption of alcohol and/or drugs). No statistically significant difference was found in the presence or absence of somatic disorders. The descriptive statistics of clinical characteristics are presented in Table 2.

As can be seen from Fig. 1, the groups also had significant difference in depression and anxiety severity: males more commonly had nonsignificant signs of anxiety and depression and less commonly — clinically significant signs.

Overall, it can be seen that females and males with chronic pain had quite different socio-demographic and clinical characteristics, which may impact the pain catastrophizing.

Cronbach's α for PCS was 0.950, and excluding any item didn't significantly change its value, which indicates an excellent internal consistency and reliability of PCS in measuring pain.

Females and males had significant difference in chronic pain catastrophizing as well, with females having higher average total scores, as well higher rumination, magnification and helplessness (Table 3).

Table 1. Socio-demographic characteristics of the sample, n (%)

Characteristic	Full sample (n = 150)	Females (n = 88)	Males (n = 62)	p
Age (years), mean ± SD	35.27 ± 13.17	38.83 ± 14.19	30.23 ± 9.63	< **0.001**
Education				
Higher education	129 (86)	69 (78.41)	60 (96.77)	**0.003**
General education diploma	21 (14)	19 (21.59)	2 (3.23)	
Marital status				
Married	62 (41.33)	48 (54.55)	37 (59.68)	< **0.001**
Unmarried	70 (46.67)	33 (37.50)	14 (22.58)	
Divorced	18 (12)	7 (7.95)	11 (17.74)	
Financial status				
Satisfied	74 (49.33)	30 (34.09)	44 (70.97)	< **0.001**
Not satisfied	67 (44.67)	51 (57.95)	16 (25.81)	
Completely not satisfied	9 (6)	7 (7.95)	2 (3.23)	
Living area				
Town	125 (83.3)	69 (78.41)	56 (90.32)	**0.088**
Rural	25 (16.67)	19 (21.59)	6 (9.68)	
Occupation				
Occupied	99 (66)	53 (60.23)	46 (74.19)	< **0.001**
Non occupied	35 (23.33)	35 (39.77)	0 (0)	
Military servicemen	16 (10.67)	0 (0)	16 (25.81)	
Physical activity				
Yes	39 (26)	7 (7.95)	32 (51.61)	< **0.001**
No	111 (74)	81 (92.05)	30 (48.38)	

To determine whether there is a difference in pain catastrophizing between different socio-demographic groups, the ANOVA was performed. It was found that there is a significant difference in magnification scores between patients with different education (those with higher education tended to magnify their pain significantly less than people with general education diploma), and between participants with different living area (patients from towns and cities had lower magnification scores than those living in rural areas). Also, a statistically significant difference in PCS total scores, rumination, magnification, and helplessness scores was found between patients with different marital status (divorced had the highest PCS scores, followed by married, while unmarried had the lowest scores), financial status (there is a gradual increase in PCS scores from the lowest in participants who were satisfied with their financial status to the highest in patients who were completely not satisfied with their financial status), and physical activity (physically active people tend to have lower scores in all PCS subscales than those who are physically inactive). Descriptive statistics with t-tests/ANOVA p-values are presented in Table 4.

Additionally, there was found a difference in PCS scores between patients with various clinical characteristics. A significant difference in PCS total score, as well as in rumination, magnification, helplessness scores was found between patients with different number of pain localizations (although those with one and two localizations had similar PCS scores, participants with more than two localizations had significantly higher mean scores in all PCS subscales), comorbidities (people with comorbid somatic illnesses had higher PCS scores in all subscales), traumatic experience in childhood (patients with traumatic events in childhood had lower PCS scores). Also, individuals with sleep disorders had significantly higher total score, rumination, magnification, helplessness scores, while patients

Table 2. Clinical characteristics of the sample

Characteristic	Full sample (n = 150)	Females (n = 88)	Males (n = 62)	p
Duration of pain	6.43 ± 6.68	8.36 ± 7.69	3.69 ± 3.40	< **0.001**
Pain intensity (VAS)	5.32 ± 2.57	6.21 ± 1.82	4.08 ± 2.94	0.078
HADS-A	10.48 ± 3.99	12.17 ± 3.24	8.08 ± 3.75	< **0.001**
HADS-D	8.71 ± 4.69	10.90 ± 4.34	5.60 ± 3.16	< **0.001**
Number of pain localizations				
One	77 (51.33)	28 (31.82)	49 (79.03)	< **0.001**
Two	17 (11.33)	16 (18.18)	1 (1.61)	
More than two	56 (37.33)	44 (50)	12 (19.35)	
Comorbid somatic diseases				
Present	78 (52)	49 (55.68)	33 (53.23)	**0.363**
Absent	72 (48)	39 (44.32)	29 (46.77)	
TBI history				
Yes	20 (13.33)	1 (1.13)	19 (30.65)	< **0.001**
No	130 (86.67)	87 (98.87)	43 (69.35)	
Traumatic experience in childhood				
Yes	59 (39.33)	63 (71.59)	34 (54.84)	**0.002**
No	91 (60.67)	25 (28.41)	28 (45.16)	
PTSD diagnosed				
Yes	16 (10.67)	16 (18.18)	0 (0)	**0.001**
No	134 (89.33)	72 (81.82)	62 (100)	
Sleep disorders				
Yes	97 (64.67)	74 (84.09)	23 (37.09)	**0.001**
No	53 (35.33)	14 (15.91)	39 (62.90)	
Substance use disorder				
Yes	65 (43.33)	16 (18.18)	49 (79.03)	< **0.001**
No	85 (56.67)	72 (81.82)	13 (20.97)	

Note: data are given as mean ± SD and n (%).

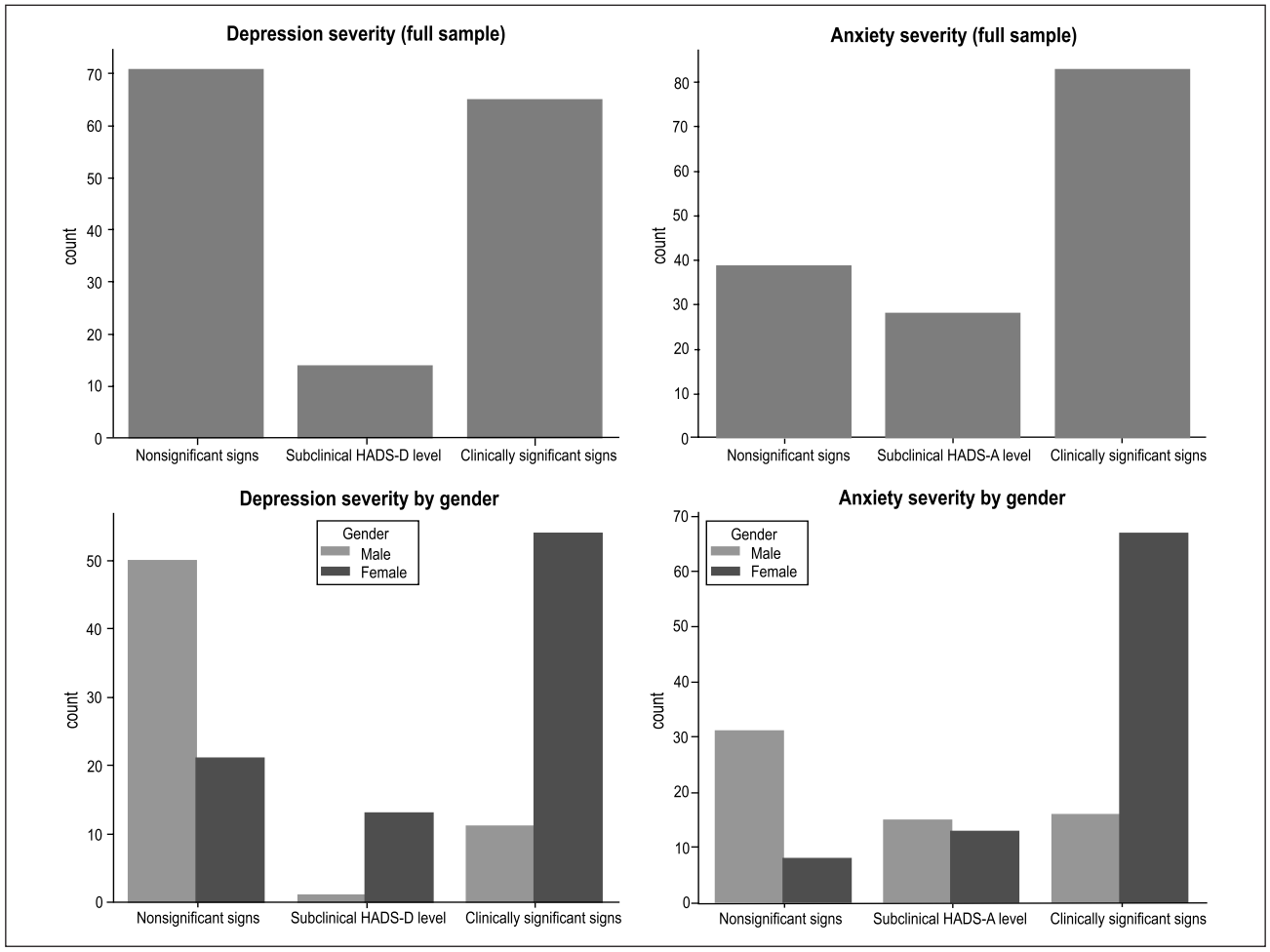

Figure 1. Depression and anxiety levels by gender

Table 3. Gender differences in PCS scores

PCS item	Full sample (n = 150)	Females (n = 88)	Males (n = 62)	p	α if deleted
1. Worry about whether the pain will end	1.56 ± 1.18	1.99 ± 1.14	0.95 ± 0.95	< **0.001**	0.948
2. Feel I can't go on	1.03 ± 1.03	1.40 ± 1.06	0.50 ± 0.72	< **0.001**	0.948
3. Pain is terrible and will never get better	0.79 ± 1.01	1.19 ± 1.10	0.23 ± 0.42	< **0.001**	0.948
4. Pain is awful and overwhelms me	1.01 ± 1.05	1.43 ± 1.04	0.40 ± 0.73	< **0.001**	0.943
5. Feel I can't stand it anymore	0.93 ± 0.87	1.30 ± 0.87	0.42 ± 0.56	< **0.001**	0.946
6. Afraid that the pain will get worse	1.65 ± 1.28	2.20 ± 1.11	0.85 ± 1.07	< **0.001**	0.942
7. Keep thinking of other painful events	1.36 ± 1.12	1.77 ± 1.08	0.77 ± 0.91	< **0.001**	0.944
8. Anxiously want the pain to go away	1.81 ± 1.26	2.23 ± 1.04	1.23 ± 1.31	< **0.001**	0.943
9. Can't keep the pain out of my mind	1.19 ± 1.17	1.56 ± 0.66	0.66 ± 0.89	< **0.001**	0.943
10. Keep thinking about how much the pain hurts	1.43 ± 1.20	2.09 ± 0.98	0.50 ± 0.80	< **0.001**	0.944
11. Keep thinking about how badly I want the pain to stop	2.02 ± 1.37	2.44 ± 1.23	1.42 ± 1.35	< **0.001**	0.943
12. Nothing I can do to reduce the intensity of pain	1.71 ± 1.40	2.07 ± 1.19	1.21 ± 1.53	< **0.001**	0.950
13. Wonder whether something serious may happen	1.51 ± 1.02	1.50 ± 0.84	1.53 ± 1.24	**0.849**	0.952
PCS total score	18.0 ± 11.9	23.2 ± 10.1	10.7 ± 10.4	< **0.001**	
PCS rumination score	6.45 ± 4.44	8.32 ± 3.82	3.81 ± 3.89	< **0.001**	
PCS magnification score	4.52 ± 2.87	5.48 ± 2.39	3.16 ± 2.97	< **0.001**	
PCS helplessness score	7.03 ± 5.14	9.38 ± 4.71	3.71 ± 3.72	< **0.001**	

with substance use disorders had lower PCS scores. Also, patients with TBI history had lower helplessness scores. No significant difference was found between people with and without PTSD. The descriptive statistics with p-values are presented in Table 5.

A series of linear regression models with PCS total score as a dependent variable, different socio-demographic and clinical independent variables, adjusted by gender, were instantiated. After controlling for gender, only marital and financial status, occupation, number of pain localizations, comorbid somatic diseases, anxiety levels, TBI history and presence of sleep disorders were still statistically significant predictors of pain catastrophizing. At the same time, age, education, living area, physical activity, duration of pain, traumatic experience in childhood, PTSD diagnosis and substance use disorder were no longer significant after controlling for gender (Table 6).

The final model that included predictors revealed to be significant at the previous step, as well as gender was statistically significant ($F = 35.690$, $p < 0.001$) with adjusted R^2 of 0.759, indicating that it can explain about 76 % of variance in pain catastrophizing (Table 7).

Therefore, the final model predicts quite a big percentage of variance in pain catastrophizing that allows us to suppose these variables may have strong relationships with catastrophizing thoughts.

Discussion

Despite the high prevalence and burden of chronic pain, it has received disproportionally little attention in research and public policy, while imposing a yearly burden of 4 % of GDP with 80 % of the costs were estimated to be productivity loss [17].

We found that catastrophic thinking has a strong connection with several socio-demographic and clinical cha-

Table 4. PCS scores by socio-demographic groups

Variable	PCS scores			
	Total score	**Rumination**	**Magnification**	**Helplessness**
Education				
Higher education	17.47 ± 11.68	6.23 ± 4.17	4.26 ± 2.70	6.98 ± 5.26
General education diploma	21.33 ± 13.08	7.81 ± 5.72	6.14 ± 3.40	7.38 ± 4.43
p-value	0.168	0.238	**0.004**	0.740
Marital status				
Married	21.29 ± 9.36	7.71 ± 3.34	5.13 ± 2.07	8.45 ± 4.58
Unmarried	13.30 ± 11.77	4.79 ± 4.67	3.40 ± 3.05	5.11 ± 4.35
Divorced	25.00 ± 13.61	8.61 ± 4.64	6.78 ± 2.69	9.61 ± 7.08
p-value	< **0.001**	< **0.001**	< **0.001**	< **0.001**
Financial status				
Satisfied	14.24 ± 11.94	4.93 ± 4.37	3.85 ± 2.97	5.46 ± 5.24
Not satisfied	20.07 ± 10.23	7.48 ± 3.94	4.93 ± 2.65	7.67 ± 3.96
Completely not satisfied	33.56 ± 6.31	11.33 ± 2.65	7.00 ± 1.50	15.22 ± 3.27
p-value	< **0.001**	< **0.001**	**0.002**	< **0.001**
Living area				
Town	17.57 ± 11.17	6.30 ± 4.02	4.27 ± 2.67	6.99 ± 4.98
Rural	20.20 ± 15.16	7.20 ± 6.16	5.76 ± 3.54	7.24 ± 6.02
p-value	0.416	0.491	**0.018**	0.827
Occupation				
Occupied	16.11 ± 12.28	5.84 ± 4.54	4.01 ± 3.15	6.26 ± 5.09
Non occupied	23.14 ± 10.91	8.06 ± 4.21	5.29 ± 1.93	9.80 ± 5.06
Military servicemen	18.50 ± 8.34	6.75 ± 3.45	6.00 ± 1.75	5.75 ± 3.47
p-value	**0.010**	0.412	< **0.001**	0.207
Physical activity				
Yes	11.28 ± 9.62	3.67 ± 3.26	3.26 ± 2.35	4.36 ± 4.46
No	20.37 ± 11.77	7.43 ± 4.39	4.96 ± 2.91	7.97 ± 5.06
p-value	< **0.001**	< **0.001**	**0.001**	< **0.001**

racteristics. Thus, we found a gender-related differences in pain catastrophizing with females being more predisposed to all catastrophizing dimensions: rumination, magnification and helplessness. These results comply with the other studies that also found that females catastrophize pain significantly more than males, while pain catastrophizing is associated with pain chronification in both sexes [18].

Pain intensity was among the strongest predictors of catastrophizing. Higher pain intensity can significantly contribute to negative cognitive patterns, particularly catastrophizing. This tendency to anticipate the worst and magnify perceived adversity underscores the importance of effective pain management strategies. Alleviating pain or altering pain perception could potentially diminish catastrophizing, thereby enhancing overall mental and physical well-being. This finding was in compliance with the research by Hirata et al. (2021) [19].

Another interesting finding was that marital status also may be a significant correlate of pain catastrophizing, yet this relationship was somehow counterintuitive: married patients tended to catastrophize more than single ones. While it seems paradoxically, considering a well-known positive role of family in psychological coping [20], there are also studies that found a family actually can be a factor of pain catastrophizing. Some researchers argue that patients can develop the fear of pain from witnessing painful experiences and may exhibit fear-avoidance behaviors in decision-making [21]. Although we didn't study pain cognitions and pain management behavior in married patients of our sample, this is a perspective direction of further research to better

Table 5. PCS scores by clinical groups

Characteristic	PCS scores			
	Total score	**Rumination**	**Magnification**	**Helplessness**
Number of pain localizations				
One	13.70 ± 11.10	5.22 ± 4.32	3.78 ± 2.98	4.70 ± 4.17
Two	12.18 ± 8.10	3.18 ± 3.15	2.94 ± 1.85	6.06 ± 3.56
More than two	25.70 ± 9.92	9.14 ± 3.43	6.02 ± 2.29	10.54 ± 4.85
p-value	< **0.001**	< **0.001**	< **0.001**	< **0.001**
Comorbid somatic diseases				
Present	21.12 ± 10.25	7.64 ± 3.84	5.24 ± 2.29	8.23 ± 4.77
Absent	14.64 ± 12.71	5.17 ± 4.69	3.74 ± 3.22	5.74 ± 5.25
p-value	< **0.001**	< **0.001**	**0.001**	**0.003**
TBI history				
Yes	16.00 ± 8.94	6.15 ± 3.63	4.55 ± 2.31	5.3 ± 3.6
No	18.32 ± 12.30	6.50 ± 4.56	4.52 ± 2.96	7.3 ± 5.3
p-value	0.420	0.744	0.960	**0.039**
Traumatic experience in childhood				
Yes	14.63 ± 11.45	5.34 ± 4.32	3.75 ± 3.11	5.54 ± 4.63
No	20.20 ± 11.75	7.18 ± 4.38	5.02 ± 2.60	8.00 ± 5.25
p-value	**0.005**	**0.013**	**0.007**	**0.004**
PTSD diagnosed				
Yes	22.25 ± 7.68	8.06 ± 3.68	5.62 ± 3.50	8.56 ± 1.31
No	17.50 ± 12.24	6.26 ± 4.49	4.39 ± 2.77	6.85 ± 5.40
p-value	0.132	0.125	0.103	0.209
Sleep disorders				
Yes	22.44 ± 10.27	7.89 ± 3.84	5.62 ± 2.40	8.94 ± 4.71
No	9.89 ± 10.40	3.83 ± 4.28	2.51 ± 2.58	3.55 ± 3.96
p-value	< **0.001**	< **0.001**	< **0.001**	< **0.001**
Substance use disorder				
Yes	12.80 ± 11.23	4.74 ± 4.29	3.60 ± 3.10	4.46 ± 4.10
No	21.99 ± 10.89	7.76 ± 4.11	5.22 ± 2.48	9.00 ± 5.01
p-value	< **0.001**	< **0.001**	< **0.001**	< **0.001**

understand the origins of pain catastrophizing and a possible role of social learning.

Financial status was also among the significant predictors of pain catastrophizing, with being more wealthier meaning being less catastrophizing. This correlates with findings of other studies that report the strong influence of socio-economic disadvantages (especially in childhood environments) on beliefs and behavior characterizing the adult years, including higher perceived sensitivity to pain and higher level of pain-related fear [22].

Also, we found that patients who were occupied at the moment of the study had significantly lower catastrophizing rates opposed to the non-occupied people, similar to previous studies [23].

Table 6. Linear regression models with PCS total score as a dependent variable, controlling for gender

Variable	B	SE	β	t	p	95% CI	
						Lower	Upper
Age (years)	–0.007	0.067	–0.007	–0.099	0.921	–0.140	0.126
Education (higher)	0.808	2.499	0.024	0.323	0.747	–4.131	5.746
Marital status (married)	7.990	1.867	0.351	4.281	< **0.001**	4.298	11.683
Financial status	–4.726	1.420	–0.241	–3.329	**0.001**	–7.531	–1.920
Living area (city)	–0.034	2.275	–0.001	–0.015	0.988	–4.531	4.463
Occupation (occupied)	–6.494	2.348	–0.251	–2.766	**0.007**	–11.142	–1.846
Physical activity (yes)	–2.913	2.177	–0.108	–1.338	0.183	–7.215	1.390
HADS-A	1.238	0.221	0.415	5.590	< **0.001**	0.800	1.676
HADS-D	0.761	0.207	0.299	3.677	< **0.001**	0.352	1.170
Duration of pain (years)	0.027	0.134	0.015	0.202	0.840	–0.238	0.292
Pain intensity (VAS)	2.110	0.316	0.454	6.680	< **0.001**	1.486	2.734
Number of pain localizations	3.781	0.936	0.297	4.038	< **0.001**	1.930	5.631
Comorbid somatic diseases (yes)	5.437	1.622	0.229	3.352	**0.001**	2.232	8.642
TBI history (yes)	6.633	2.670	0.190	2.485	**0.014**	1.357	11.908
Traumatic experience in childhood (yes)	–2.385	1.768	–0.098	–1.349	0.179	–5.878	1.109
PTSD diagnosis (yes)	–1.125	2.833	–0.029	–0.397	0.692	–6.724	4.474
Sleep disorders (yes)	8.262	1.883	0.333	4.389	< **0.001**	4.542	11.983
Substance use disorder (yes)	–2.650	2.111	–0.111	–1.256	0.211	–6.821	1.521

Table 7. Multiple linear regression model with PCS total score as a dependent variable and a set of socio-demographic and clinical independent variables

Variable	B	SE	β	t	p	95% CI	
						Lower	Upper
Intercept	17.480	3.251		5.377	< **0.001**	11.038	23.923
Marital status (married)	3.940	1.877	0.166	2.099	**0.038**	0.220	7.660
Financial status	–7.055	1.219	–0.350	–5.789	< **0.001**	–9.469	–4.640
Occupation (occupied)	–1.224	1.862	–0.047	–0.658	0.512	–4.914	2.465
Pain intensity (VAS)	1.930	0.373	0.438	5.180	< **0.001**	1.191	2.668
HADS-A	0.051	0.283	0.018	0.179	0.859	–0.510	0.611
HADS-D	0.353	0.239	0.147	1.478	0.142	–0.120	0.27
Number of pain localizations	–0.827	1.028	–0.064	–0.805	0.422	–2.864	1.209
Comorbid somatic diseases (yes)	–7.045	2.232	–0.299	–3.156	**0.002**	–11.46	–2.621
TBI history (yes)	4.904	2.902	0.120	1.690	0.094	–0.846	10.654
Sleep disorders (yes)	–0.157	2.347	–0.07	–0.067	0.947	–4.808	4.494
Gender (male)	–8.176	2.022	–0.332	–4.044	< **0.001**	–12.182	–4.169

Anxiety is a well-known correlate of pain catastrophizing, having indirect association with pain interference through catastrophizing [24, 25] that was supported by the results of our study. We also found a positive relationship between depression and pain catastrophizing that supports findings about mediation role of catastrophizing in the association of pain severity and depression [26].

Another interesting finding was a positive relationship between the number of pain localizations and pain catastrophizing. We couldn't find another studies to compare our results with findings of other researchers, and, considering the study design, to be sure about the direction of this relationship (whether it pain catastrophizing leads to the increased sensitivity to pain and "discovering" new sites of pain in our body, or it's localized pain that reduces our maladaptive beliefs about the nature and course of pain). This makes the relationship of pain localization and pain catastrophizing another interesting direction for further research.

We found pain catastrophizing to be associated with more comorbidities as well, similar to the data of other studies that opens the gate to more research on modifiable risk factors and treatment strategies in patients with comorbid diseases [27].

Some researchers argue that better sleep quality is related to less catastrophizing perceptions of pain, as well as a reduction in pain intensity [28]. Our results support these data: it was found that sleep disorders have a positive relationship with pain catastrophizing, meaning that better sleep quality may be associated with less maladaptive pain cognitions.

Last but not least, we found a positive relationship between traumatic brain injury and pain catastrophizing, which is supported by the results of the other studies. For example, Shi with colleagues [29] argue that catastrophizing is associated with misperceptions of cognitive functioning following mild TBI.

It seems necessary to reduce pain catastrophizing in patients with chronic pain at an early stage through targeted and effective measures to promote therapy adherence and obtain better rehabilitation outcomes [30]. Further studies may be focused on developing the management and treatment strategies that incorporate the knowledge of possible pain catastrophizing dimensions and factors.

Strengths and limitations

The study has several strengths, including a well-defined inclusion and exclusion criteria, ensuring a focus on adults with chronic pain lasting more than three months based on ICD-11 standards. The use of validated psychometric tools like the PCS, alongside psychiatric and neurological evaluations, adds rigor to the assessment of participants. Additionally, adherence to ethical guidelines and anonymity in data collection enhances the reliability and ethical integrity of the study.

However, there are limitations, such as potential biases due to the self-report nature of the PCS and a relatively narrow demographic range, which may limit generalizability. Moreover, the exclusion of participants with severe cognitive impairment or chronic non-communicable diseases may omit important subgroups of chronic pain patients from the analysis. Lastly, the reliance on a single medical center for recruitment may limit the external validity of the findings.

Conclusions

The findings of this study underscore the significant impact of pain catastrophizing on individuals with chronic pain, revealing its strong connections to various socio-demographic and clinical characteristics. Notably, gender differences emerged, with females exhibiting higher levels of all dimensions of catastrophizing, including rumination, magnification, and feeling of helplessness. This aligns with existing literature that associates increased pain catastrophizing with pain chronification in both genders. Additionally, the counterintuitive relationship between marital status and pain catastrophizing, when married individuals reported higher levels than single ones, highlights the complex interplay of social dynamics and pain perception. Economic factors also played a critical role, as greater financial stability correlated with lower levels of catastrophizing, suggesting that socioeconomic status can influence pain-related beliefs and behaviors.

Moreover, the study established links between pain catastrophizing and psychological factors, such as anxiety and depression, confirming their mediation role in the relationship between pain severity and emotional distress. The association of pain catastrophizing with the number of pain localizations warrants further exploration, particularly regarding whether heightened catastrophizing leads to increased pain sensitivity or if multiple pain sites exacerbate maladaptive beliefs. Additional findings indicate that sleep quality significantly affects pain catastrophizing, with poorer sleep correlating with more maladaptive pain perceptions. Furthermore, a positive relationship was observed between traumatic brain injury and pain catastrophizing, suggesting that cognitive misperceptions may arise after injury.

Overall, these results highlight the necessity of addressing pain catastrophizing early in chronic pain management to enhance treatment adherence and rehabilitation outcomes. Future research should aim at developing targeted strategies that consider various dimensions and predictors of pain catastrophizing, potentially leading to improved therapeutic interventions and quality of life for patients suffering from chronic pain.

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Психологічні, клінічні та соціодемографічні предиктори катастрофізації болю в пацієнтів із хронічним болем: висновки крос-секційного дослідження

Резюме. ***Актуальність.*** З огляду на складність хронічного болю та його значний психологічний вплив, включно з роллю дезадаптивних думок щодо болю, як-от катастрофізація болю, стає необхідним глибше дослідити фактори, що призводять до цього явища. ***Мета:*** вивчення психологічних, клінічних та соціодемографічних предикторів катастрофізації болю в українській популяції пацієнтів із хронічним болем. ***Матеріали та методи.*** Було проведене крос-секційне обсерваційне дослідження 150 пацієнтів із хронічним болем, які дали згоду на участь. Для вивчення структури та корелятів катастрофізації в осіб із хронічним болем використовували набір соціодемографічних і клінічних характеристик, а для дослідження психологічних факторів, як-от депресія, тривога й катастрофізація, — шкалу катастрофізації болю та госпітальну шкалу тривоги та депресії. Інтенсивність болю оцінювали за візуальною аналоговою шкалою. ***Результати.*** Дослідження виявило значні позитивні зв'язки між катастрофізацією болю й різними соціодемографічними факторами. Жінки демонстрували вищі рівні румінації, перебільшення та безпорадності порівняно з чоловіками. Установлено, що сімейний статус і фінансова стабільність впливають на рівень катастрофізації, а психологічні фактори, як-от тривога й депресія, сильно корелювали з катастрофізацією болю. Крім того, погіршення якості сну та більша кількість локалізацій болю були пов'язані з підвищеною катастрофізацією, що підкреслює складність цих взаємозв'язків. ***Висновки.*** Отримані результати підкреслюють необхідність ранніх стратегій втручання, спрямованих на зниження катастрофізації в пацієнтів із хронічним болем, для покращення результатів лікування. Майбутні дослідження повинні досліджувати цілеспрямовані підходи до лікування, які враховують соціодемографічні, клінічні й психологічні фактори, що впливають на катастрофізацію болю, для підвищення ефективності терапії та якості життя пацієнтів.

Ключові слова: психологічні, клінічні, соціодемографічні предиктори; фактори; катастрофізація болю; хронічний біль