Two faces of chronic pain: distinct psychosocial profiles in headache and fibromyalgia

A. De Sandi[1], A. Marfoli[2], E.N. Aiello[3], D. Mellace[2], C. Manzoni[2], B. Poletti[2,3], M. Vergari[1], F. Cogiamanian[1], G. Pravettoni[2,4], A. Priori[5,6], R. Ferrucci[1,2]

[1]Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico, Milan; [2]Department of Oncology and Haemato-Oncology, University of Milan; [3]Department of Neurology and Laboratory of Neuroscience, IRCCS Istituto Auxologico Italiano, Milan; [4]Applied Research Division for Cognitive and Psychological Science, IEO, European Institute of Oncology, Milan; [5]Aldo Ravelli Centre for Neurotechnology and Experimental Brain Therapeutics, Department of Health Sciences, University of Milan; [6]Clinical Neurology Unit, Department of Health Sciences, ASST Santi Paolo e Carlo, Milan, Italy.

Abstract

Objective

Chronic pain significantly impacts quality of life. Headache and fibromyalgia are common chronic pain disorders, often linked to cognitive, emotional, and social impairments. This study examined the associations between pain, related symptoms, and psychosocial outcomes in individuals with chronic headache and fibromyalgia.

Methods

A cross-sectional online study was conducted on 42 participants: 21 with chronic headache and 21 with fibromyalgia. Data were collected on pain intensity and interference (Numeric Rating Scale, Brief Pain Inventory) and psychosocial variables (Pain Self-Efficacy Questionnaire, Pain Catastrophising Scale, 12-Item Short Form Survey).

Results

Headache participants reported moderate pain intensity (mean NRS=5.5, SD=2.3), with BPI intensity significantly correlated with general activity (r=0.621, p=0.003), mood (r=0.730, p=0.001), and self-efficacy (r=0.515, p=0.017). Specific symptoms such as motor (r_s=0.682, p=0.001) and sensory deficits (r_s=0.541, p=0.011) were strongly associated with PCS rumination. In the fibromyalgia group, pain intensity was higher (mean NRS=7.38, SD=2.2) and correlated with PCS total (r=0.606, p=0.004), helplessness (r=0.777, p<0.001), and interference with daily life (r=0.823, p<0.001). Mental health (SF-12 MCS) was negatively associated with pain in fibromyalgia but not in headache.

Conclusion

While both conditions are linked to psychosocial impairment, fibromyalgia was associated with higher pain intensity and stronger correlations with psychological dysfunction, while chronic headache showed more selective associations, particularly involving perceived interference with mood and ruminative thinking.

Key words

chronic pain, fibromyalgia, chronic headache, psychosocial factors, pain catastrophising, self-efficacy

Angelica De Sandi, PsyD
Angelica Marfoli, PsyD
Edoardo Nicolò Aiello, PsyD, PhD
Denise Mellace, PsyD
Carlo Manzoni, MSc
Barbara Poletti, PsyD, PhD
Maurizio Vergari, MSc
Filippo Cogiamanian, MD
Gabriella Pravettoni, PsyD, PhD
Alberto Priori, MD, PhD
Roberta Ferrucci, PsyD, PhD

Please address correspondence to:
Roberta Ferrucci
Dipartimento di Oncologia ed
Emato-Oncologia,
Università degli Studi di Milano,
Via F. Sforza 35,
20122 Milano, Italy.
E-mail: roberta.ferrucci@unimi.it
ORCID: 0000-0001-5109-9483

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Introduction

Chronic pain is defined as pain that persists or recurs for more than 3 months (1). It is a complex and multifaceted condition that can impact all aspects of a person's functioning, emotional, interpersonal, social, as well as physical, compromising overall quality of life and autonomy (2). Key factors associated with chronic pain include pain-related disability, pain intensity, pain catastrophising, psychological distress, perceived injustice, insomnia, fatigue, and self-efficacy (3). Among chronic pain disorders, headaches and fibromyalgia are particularly impactful, often combining intense symptoms with cognitive and emotional dysfunctions (4).

Primary headaches are disorders characterised by recurrent or persistent head pain without an identifiable underlying cause; in contrast, secondary headaches occur as a consequence of specific underlying conditions or triggering events (5). All primary headache disorders, including migraine, tension-type headache, and trigeminal autonomic cephalalgias, have the potential to evolve into chronic forms. According to the International Classification of Headache Disorders (ICHD-3), chronic headache is defined as headache occurring on 15 or more days per month for at least three consecutive months (6). Headache disorders, especially chronic ones, are among the most disabling conditions worldwide (7). They are associated with a significant reduction in quality of life, negatively impacting emotional well-being, social functioning, and participation in daily activities (8). Furthermore, this condition leads to increased healthcare costs and greater disability, with considerable effects on work productivity and daily functioning (8).

Fibromyalgia is a chronic pain condition characterised by chronic widespread pain, hyperalgesia and/or allodynia, and the presence of several tender pain points (9). It is commonly associated with persistent fatigue, sleep disturbances, and an overall reduction in quality of life (10). Individuals with fibromyalgia frequently present psychological disturbances, including anxiety, depression, pain catastrophising, and elevated stress levels, with increased sensitivity to painful stimuli and challenges in coping with their condition (11). Consequently, they often face significant limitations in daily functioning**,** reduced autonomy, and a marked decline in quality of life (12).

Validated self-report instruments are now available to assess the multidimensional effects of chronic pain, including its emotional and functional consequences (13). Technological innovations have opened new avenues for data collection, allowing researchers to reach patients remotely through online platforms. These tools facilitate the large-scale examination of the complex relationships between pain and social behaviour, offering novel insights into the mechanisms involved in chronic pain processing. A recent study (14) conducted through an online questionnaire demonstrated that psychological variables, such as pain catastrophising and self-efficacy, significantly influence daily functioning and perceived physical and mental health in patients with fibromyalgia, demonstrating a stronger influence than pain intensity itself. However, similar detailed investigations in chronic headache populations remain limited, especially in direct comparison with other chronic primary pain conditions. Given the significant interrelation between pain and psychosocial factors, the present study aims to contribute to a better understanding of how chronic pain and related psychological variables influence functional outcomes in individuals with chronic headache and fibromyalgia.

Specifically, we explored these associations in individuals with chronic headache, comparing them to a clinical group with fibromyalgia. Our objectives were: 1) to investigate the correlation between pain intensity and psychosocial variables such as pain catastrophising, self-efficacy, perceived physical and mental health, and social interference; 2) to identify whether specific headache-related symptoms (*e.g.* photophobia, nausea) are more strongly associated with psychological aspects such as rumination or helplessness; and 3) to compare the two clinical groups in terms of the strength and pattern of these associations, in order to highlight condition-specific psychosocial profiles.

Methods

Participants

We examined 42 individuals with chronic pain, specifically 21 individuals with chronic headache and 21 with fibromyalgia, using a digital questionnaire. Responses were recorded between October 2023 and February 2024. All participants were recruited online from different regions of Italy through multiple channels, including Italian associations, healthcare professionals and direct patient outreach. Eligible participants were adults (≥18 years) with a self-reported medical diagnosis of either chronic headache or fibromyalgia. Individuals with both diagnoses, additional chronic pain disorders, or severe psychiatric or neurological conditions were excluded.

The study was approved by the appropriate ethics committee of Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico (Ethics Committee Milan Area 2) and was conducted in accordance with the Declaration of Helsinki. Informed consent was obtained from all participants.

Materials

After completing a web-based consent to data processing, participants received a link directly on their devices (computers, smartphones, or tablets) that enabled them to access an online questionnaire structured into two main sections. The first section consisted of a series of closed- and open-ended questions aimed to collect clinical, socio-demographic, and pain-related data. For participants with chronic headache, this section additionally included questions designed to assess headache-related phenomena (*e.g.* aura, photophobia, nausea, motor and visual disturbances), developed in accordance with the diagnostic criteria of the ICHD-3 (6).

The second section included five standardised psychometric instruments designed to assess specific dimensions related to chronic pain and psychological characteristics. The questionnaire included a variety of response formats, such as single-choice, multiple-option, open-ended, graded, and Likert scale items. The psychometric instruments administered were as follows: Numerical Rating Scale (NRS) (15); Pain Self-Efficacy Questionnaire (PSEQ) (16, 17); Pain Catastrophising Scale (PCS) (18); Brief Pain Inventory (BPI)(19, 20); Short Form Survey (SF-12) (21).

The NRS (15) was used to assess both pain intensity and mood. Participants were asked to indicate, on a 10 cm premarked line, the number that best represented the severity of their pain or the quality of their mood, ranging from 0 to 10. Higher scores reflected greater perceived pain intensity or a more positive mood.

The PSEQ (16, 17) is a self-administered questionnaire designed to assess the individual's perceived self-efficacy in performing daily activities despite the presence of chronic pain. It consists of 10 items each rated on a 7-point Likert scale ranging from 0 to 6, resulting in a total score between 0 and 60. Higher scores indicate greater self-efficacy, reflecting a stronger belief in one's ability to manage pain and remain functionally active. Conversely, lower scores suggest a focus on pain and reduced perceived control.

The PCS (18) is a self-report questionnaire designed to assess the extent of catastrophic thinking associated with the experience of chronic pain. It includes 13 items, each rated on a 5-point scale from 0 (not at all) to 4 (all the time), based on how frequently the individual experiences specific thoughts and feelings during episodes of pain. The total score ranges from 0 to 52, with higher scores reflecting greater levels of pain-related catastrophising.

The BPI (19, 20) evaluates pain severity and its interference with various aspects of quality of life through a set of 15 items. Each item is rated on a 10-point Likert scale, where higher scores reflect greater pain intensity and a higher degree of interference in the corresponding domain of daily functioning.

The SF-12 (21) is a widely used instrument for assessing health-related quality of life, specifically focusing on physical and mental well-being. It consists of 12 items, from which two summary scores are derived: the Physical Component Summary (PCS) and the Mental Component Summary (MCS). Lower scores on either index indicate greater impairment in the respective domain of health.

Statistical analysis

Variables were screened for normality through skewness and kurtosis values <|1| and |3|, respectively (22). Pearson's correlation coefficient was used to assess associations between measures of pain intensity (BPI Intensity, NRS Pain) and psychosocial outcomes (NRS mood, PCS, PSEQ, SF-12 scores). Within the headache group, Spearman's correlation was used to examine the relationship between symptom variables (*e.g.* visual, motor, or sensory disturbances) and psychosocial outcomes (PCS, PSEQ, SF-12 scores). Between-group comparisons (*i.e.* headache *vs.* fibromyalgia) were carried out using independent-samples t-tests on pain and psychosocial measures (*e.g.* BPI, NRS, PCS, SF-12). All tests were two-tailed, and the statistical threshold was set at α=0.05. No imputation was applied for missing data. Descriptive statistics are reported as means and standard deviations. All analyses were conducted using Jamovi version 2.3 (the Jamovi project, 2022).

Results

The sample consisted of 21 participants with chronic headache (mean ± SD: 39.4±14.4 years; 66.7% women) and 21 participants with fibromyalgia (41.2±12.9 years; 100% women). Table I reports demographic and clinical characteristics. Descriptive statistics of headache-related symptoms are presented in Table II.

Spearman's correlations showed that symptom-related variables were associated with psychological outcomes. PCS total score was positively correlated with cardiovascular deficit (r_s=0.434, p=0.023), motor deficit (r_s=0.481, p=0.027), and sensory deficit (r_s=0.442, p=0.045). PCS rumination subscale was correlated with lacrimation (r_s=0.439, p=0.047), CV deficit (r_s=0.485, p=0.026), motor deficit (r_s=0.682, p=0.001), and sensory deficit

Table I. Participants' background and clinical characteristics.

	Headache	Fibromyalgia
Nunber	21	21
Age (years)	39.43 ± 14.41	41.19 ± 12.87
Sex		
Male	33.3 %	-
Female	66.7 %	100 %
Education (years)		
Middle school	38.1%	9.5%
High school	19.0%	19.0%
Bachelor's degree	4.8%	14.3%
Master's degree	23.8%	52.4%
Post-lauream	14.3%	4.8%
Civil status		
Single/married/cohabiting	19%/57.1%/23.8%	28.6%/33.3%/38.1%
Smoking status		
Yes/no	14.3% / 85.7%	33.3%/66.7%
Comorbidities		
Yes/no	33.3%/66.7%	76.2%/23.8%
Prophylactic pharmacotherapy		
Yes/no	52.4%/47.6%	76.2%/23.8%
Acute pharmacotherapy		
Yes/no	100%/0%	95.2%/4.8%
Pain exacerbation with moderate physical activity		
Yes/no	61.9%/38.1%	76.2%/23.8%
NRS		
Pain	5.5 ± 2.3 (0-9)	7.4 ± 2.2 (2-10)
Mood	3.7± 2.1 (1-10)	4.1 ±2.9 (0-10)
BPI		
Intensity	1.9 ± 1.7 (0-5.8)	5.6 ± 2.1 (1.5-10)
Interference	1.8 ± 2.0 (0-6.6)	6.3 ± 2.0 (2.86-10)
SF-12		
Physical	45.0 ± 7.9 (29.5- 59.6)	30.9 ± 6.2(18.1-42.7)
Mental	39.2 ± 10.3 (22.1-59.8)	36.1 ± 11.0 (19.1-62.5)
PSEQ	24.6 ± 14.5 (0-57)	21.4 ± 12.7 (0-49)
PCS	26.05 ± 9.9 (5-49)	31.3 ± 9.8 (17-52)

NRS: Numeric Pain Rating Scale; PCS: Pain Catastrophising Scale; PSEQ: Pain Self-Efficacy Questionnaire; BPI: Brief Pain Inventory; SF-12: Short Form Survey.

Table II. Descriptive statistics of headache-related symptoms.

Symptom	Headache
Nausea	3.8 ± 3.3
Vomiting	1.5 ± 1.9
Photophobia	3.1 ± 2.9
Phonophobia	3.5 ± 2.8
Osmophobia	1.1 ± 1.6
Lacrimation	1.7 ± 2.9
Rhinorrhoea	0.2 ± 0.5
Visual deficit (Deficit CV)	1.3 ± 2.3
Motor deficit	1.5 ± 2.5
Sensory deficit	1.3 ± 2.1
Dysphasia	0.5 ± 1.2
Other	0.0 ± 0.0

Values are expressed as mean ± standard deviation.

(r_s=0.541, p=0.011). Furthermore, BPI Interference was associated with nausea (ϱ=0.526, p=0.014) and inversely associated with phonophobia (r_s= -0.449, p=0.041). MCS was negatively correlated with motor deficits (r_s= -0.510, p=0.018).

Correlations between pain intensity and psychosocial outcomes in headache and fibromyalgia groups are reported in Table III.

In the headache group, Pearson's correlations revealed that BPI-Intensity was significantly associated with several psychosocial outcomes. Specifically, it correlated positively with PSEQ (r=0.515, p=0.017), BPI 9A–General Activity (r=0.621, p=0.003), BPI 9D–Work (r=0.661, p=0.001), BPI 9G–Enjoying Life (r=0.498, p=0.022), and BPI Interference (r=0.672, p=0.001), and showed a strong association with BPI 9B–Mood (r=0.730, p=0.001). No significant associations were observed between BPI Intensity and NRS Mood, PCS subscales, or MCS. NRS Pain showed a significant positive correlation with PCS helplessness (r=0.457, p=0.037), while no other psychosocial measures were significantly associated.

In the fibromyalgia group, both pain intensity measures were associated with several psychosocial variables. NRS Mood was negatively correlated with BPI Intensity (r= -0.622, p=0.003) and NRS Pain (r= -0.517, p=0.016). NRS Pain was also negatively associated with PSEQ (r= -0.462, p=0.035). BPI Intensity was positively correlated with PCS total (r=0.606, p=0.004), PCS helplessness (r=0.777, p=0.000), PCS rumination (r=0.457, p=0.026), and BPI Interference (r=0.737, p=0.000). It also showed strong correlations with several BPI interference items, particularly BPI 9A–General Activity (r=0.823, p=0.000). MCS was negatively correlated with both BPI Intensity (r= -0.726, p=0.000) and NRS Pain (r= -0.433, p=.0050).

Independent-samples t-tests revealed significant differences between groups in pain and disability outcomes. The fibromyalgia group reported significantly higher levels of pain on both the NRS (M=7.4 *vs.* 5.5; p=0.009) and BPI Intensity scale (M=5.6 *vs.* 1.9; $p<0.001$). All BPI interference subscales indicated greater pain-related disability in the fibromyalgia group (all $p<0.05$). PCS helplessness scores were also significantly higher in the fibromyalgia group (M=14.3 *vs.* 10.8; p=0.022). No significant group differences were found for NRS Mood, PSEQ, PCS total, or MCS. The subscale PCS of SF-12 indicated significantly better physical functioning in the headache group (M=45.0 *vs.* 30.9; $p<0.001$).

Discussion

This study explored the relationships between pain and psychosocial outcomes in individuals with chronic headache compared to a group with fibromyalgia. While both groups reported a significant impact of pain on daily functioning, the nature and strength of correlations between pain and psychosocial variables varied between conditions, suggesting different underlying mechanisms.

In the headache group, pain intensity measured by the BPI was significantly

Table III. Pearson's correlations between pain intensity and psychosocial outcomes in headache and fibromyalgia groups.

	Headache				Fibromyalgia			
	BPI Intensity		NRS Pain		BPI Intensity		NRS Pain	
	r	*p*	r	*p*	r	*p*	r	*p*
NRS Mood	0.041	0.859	-0,428	0,053	-0.622*	0.003	-,517*	0,016
PSEQ	0.515*	0.017	-0,178	0,440	-0.386	0.084	-,462*	0,035
PCS Total	0.179	0.437	0,363	0,106	0.606*	0.004	,450*	0,041
PCS Helplessness	0.088	0.705	,457*	0,037	0.777*	0.0	,662*	0,001
PCS Rumination	0.198	0.391	0,190	0,409	0.485*	0.026	0,324	0,151
PCS Magnification	0.197	0.391	0,181	0,433	0.073	0.752	-0,045	0,846
BPI 9A	0.621*	0.003	-0,003	0,989	0.823*	0.0	,562*	0,008
BPI 9B	0.73*	0.0	-0,006	0,979	0.393	0.078	-0,085	0,714
BPI 9C	0.403*	0.07	-0,182	0,430	0.353	0.117	,522*	0,015
BPI 9D	0.661*	0.001	0,098	0,672	0.668*	0.001	0,411	0,064
BPI 9E	0.647*	0.002	0,003	0,989	0.399	0.073	0,401	0,072
BPI 9F	0.415	0.061	0,180	0,435	0.5*	0.021	,471*	0,031
BPI 9G	0.498*	0.022	-0,041	0,861	0.446*	0.043	0,312	0,169
BPI Interference	0.672*	0.001	0,029	0,902	0.737*	0.0	,534*	0,013
PCS	-0.099	0.669	-0,315	0,164	-0.206	0.37	-0,292	0,199
MCS	-0.273	0.232	-0,179	0,437	-0.726*	0.0	-,433*	0,050

NRS: Numeric Pain Rating Scale; PCS: Pain Catastrophising Scale; PSEQ: Pain Self-Efficacy Questionnaire; BPI: Brief Pain Inventory; SF-12: Short Form Survey.
Asterisks (*) denote statistical significance.

correlated with interference in general activity, work, enjoyment of life, and mood. The strongest correlation emerged between BPI intensity and mood interference, highlighting the influence of pain on emotional well-being. These results are consistent with prior studies showing that even moderate headache pain can have a significant emotional and psychological impact, particularly in terms of depression and anxiety (23-25). Interestingly, no significant association was observed between pain intensity and sleep or walking interference, activities often considered protective against the development of chronic pain (26, 27). This may indicate that the impact of headache-related disability may be more cognitively and socially mediated than physically limiting.

Pain intensity also showed a positive correlation with self-efficacy (PSEQ), contrary to expectations. Typically, individuals with lower pain intensity tend to report greater self-efficacy, highlighting its protective role in chronic pain conditions (28, 29). This result in the headache group may reflect a different dynamic compared to other forms of chronic pain. In headache conditions, higher pain intensity does not necessarily translate into greater disability; rather, it may prompt individuals to become more proactive in managing their symptoms and to develop coping strategies, thereby enhancing their perceived self-efficacy.

In the fibromyalgia group, pain intensity was broadly correlated with psychosocial distress. Both BPI and NRS pain scores were negatively associated with mood and mental health (MCS) and positively associated with pain catastrophising (especially the helplessness and rumination subscales of the PCS), as well as disability in daily activities. These findings are consistent with the literature on fibromyalgia, which suggests that individuals with fibromyalgia frequently present mood disorders (*e.g.* anxiety, depression) and maladaptive cognitive patterns, such as pain catastrophising (11, 30). Notably, catastrophic thinking plays a key role in determining daily functioning and mental health status in this clinical population, showing greater influence than pain intensity (14) .

Correlational differences between groups were particularly evident regarding mental health. In the headache group, no association was observed between pain and MCS, whereas in the fibromyalgia group, both BPI intensity (ϱ= -0.726, p<0.001) and NRS pain (ϱ= -0.433, p=0.050) were significantly negatively associated with mental health. This divergence reflects the chronicity and severity of pain in fibromyalgia, which has been shown to significantly affect depression and anxiety (11). The absence of this association in the headache group might also reflect that the pain experience has a less pervasive psychological impact. Individuals with chronic headache might maintain better emotional regulation or engage in more effective coping strategies that buffer the effects of pain on overall mental health.

Further insights emerged from the analysis of headache-related symptoms. Sensory, motor, and visual deficits were positively associated with pain catastrophising scores, particularly rumination, suggesting that the presence of these symptoms might reinforce negative cognitive patterns related to pain experience. These can affect emotional or cognitive functioning, contributing to worsening the experience of pain itself (31). Nausea was associated with greater pain interference, while photophobia showed an inverse correlation, findings that warrant further exploration but may reflect symptom-specific coping demands and behavioural responses. These associations support the cognitive-behavioural model of chronic pain, in which symptom perception and interpretation play a central role in shaping outcomes, facilitating the development of new thinking skills that explicitly challenge the cognitive causes of chronic pain (32, 33).

Between-group comparisons revealed significantly higher pain intensity, pain interference, and psychosocial distress in the fibromyalgia group. Participants with fibromyalgia reported greater interference in sleep, work, and walking, and exhibited higher levels of catastrophising and lower physical functioning. These results are consistent with previous research showing that fibromyalgia is characterised by widespread pain, reduced physical capacity, and elevated psychological comorbidity (34, 35). In contrast, headache-related burden appeared to manifest with a stronger cognitive-emotional component but with relatively preserved physical functioning.

The findings emphasise the importance of multidimensional assessment in chronic pain populations. While headache and fibromyalgia share some common psychosocial features, their distinct profiles highlight the need for tailored interventions. These contrasting psychosocial patterns indicate that chronic pain syndromes differ not only in biological mechanisms but also in emotional and cognitive modulation. From a clinical perspective, this supports the adoption of a biopsychosocial approach to chronic pain management, recognising that effective treatment must address both psychological and behavioural dimensions (36).

This study presents several limitations that should be acknowledged. First, the relatively small sample size reduces the statistical power and limits the generalisability of the findings to broader populations. The findings should be interpreted considering the exploratory analytic approach underlying this study. The assessment tools employed, while widely validated, did not encompass the full range of psychosocial variables potentially relevant to chronic pain, which may have limited a more nuanced understanding of the mechanisms involved. Furthermore, although self-report questionnaires offer several advantages in terms of feasibility and ecological validity, reliance on these measures may also introduce limitations such as recall bias, social desirability effects, and situational influences on responses, which can affect the accuracy of self-reported information (37). The online recruitment procedure, while reflecting real-world practice, may have introduced a self-selection bias (38). Participants who are more motivated, health-conscious, or engaged with patient associations may have been more likely to take part in the study, potentially excluding individuals who are less digitally connected, less health-aware, or less involved in support networks. Another limitation concerns the exclusion of participants with comorbid chronic headache and fibromyalgia. Although this approach ensured homogeneity between groups and avoided potential overlap in symptom presentation, it may limit the generalisability of our findings to real-world clinical settings, where overlapping chronic pain syndromes are frequently observed (39). Finally, the cross-sectional design prevents causal inferences and does not allow for tracking symptom evolution or changes in psychosocial functioning over time.

Conclusions

In summary, this study suggests that the relationship between pain and psychosocial outcomes differs between chronic headache and fibromyalgia. While both conditions are associated with impaired functioning, individuals with fibromyalgia exhibit more severe and pervasive impairments, including stronger associations with catastrophising, reduced physical functioning, and lower mental health.

Conversely, chronic headache patients showed more selective associations, particularly between pain intensity and its perceived interference with mood, as well as between specific headache-related symptoms and the rumination component of pain catastrophising. Notably, the positive correlation between pain intensity and self-efficacy in the headache group may reflect adaptive coping mechanisms in this population. From a clinical perspective, these findings highlight the importance of tailoring treatment strategies to the specific profiles of each condition. For patients with fibromyalgia, a comprehensive and multidisciplinary approach is crucial, with targeted interventions addressing both the cognitive-emotional aspects of pain (*e.g.*, catastrophising and low mood) and functional limitations. Cognitive-behavioural therapy (CBT), physical rehabilitation, and interventions aimed at enhancing emotional regulation and resilience may be particularly beneficial (40, 41) .

In contrast, the clinical management of chronic headache might benefit from more focused interventions aimed at mitigating mood interference and targeting specific maladaptive cognitive patterns such as rumination (42). Moreover, the observed link between higher pain intensity and greater self-efficacy in this group suggests that interventions aimed at reinforcing existing coping strategies and self-management skills could further enhance patient outcomes. In rheumatology practice, particularly in conditions such as fibromyalgia, systematic assessment of pain-related beliefs, emotional functioning, and self-efficacy can help identify individual psychosocial profiles and guide personalised, multidisciplinary interventions integrating pharmacological, psychological, and rehabilitative strategies.

Overall, the results underscore the necessity for individualised assessment and multimodal treatment planning in chronic pain conditions, integrating both physical and psychosocial dimensions to improve quality of life and long-term clinical outcomes.

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