▪ Headache Medicine 2024, 15(4): Online First ▪ p-ISSN 2178-7468, e-ISSN 2763-6178

Headache Medicine

Original

Patients' beliefs and headache-related disability

Rebeca Veras de Andrade Vieira[1], Juliane Prieto Peres Mercante[2], Talita Souza Perboni[3], Walkyria Busato Will[4], Murilo Ricardo Zibetti[1], William Barbosa Gomes[5], Gustavo Gauer[5]

[1]University of Vale do Rio dos Sinos, São Leopoldo, Rio Grande do Sul, Brazil
[2]University of Sao Paulo, Sao Paulo, Sao Paulo, Brazil
[3]Hospital Institute of Neurology, Curitiba, Parana, Brazil
[4]Pontifical Catholic University of Parana, Curitiba, Parana, Brazil
[5]Federal University of Rio Grande do Sul, Porto Alegre, Rio Grande do Sul, Brazil

Rebeca Veras de Andrade Vieira
rebecavieirapsico@gmail.com

Edited by:
Marcelo Moraes Valença

There is a lack of studies investigating the associations between modifiable psychological factors in migraine more comprehensively. The present study aimed to investigate the associations between self-efficacy and locus of control beliefs, cognitive distortions, depression, anxiety, psychopathological symptoms, headache headache-related disability, headache frequency, and severity in migraine patients. In addition, we compared study measures between chronic and episodic migraine patients. One hundred forty-seven (147) migraine outpatients from three Brazilian specialized headache hospital services completed measures of self-efficacy, locus of control, psychopathological symptoms, cognitive distortions, depression, anxiety, and headache-related disability. Headache-related cognitive distortions were positively correlated with psychopathological symptoms, depression, anxiety, pain catastrophizing, headache-related disability, headache frequency, and headache intensity. Self-efficacy beliefs correlated negatively with all psychological and clinical measures. Chance locus of control correlated positively with depression, anxiety, psychopathological symptoms, pain catastrophizing, headache-related disability, and headache intensity. Compared to episodic migraine patients, those with chronic migraine showed significantly higher levels of cognitive distortions and chance locus of control but lower levels of self-efficacy in headache management. The results brought evidence that patients' cognitive and emotional responses to their headaches are associated with headache-related disability and chronicity. Furthermore, they reinforce the need to evaluate and treat those modifiable psychological factors in daily clinical practice.

Keywords:
Migraine
Disability
Cognitive Distortions
Self-efficacy
Psychiatric comorbidities

Submited: October 8, 2024
Accepted: December 16,2024
Published online: December 30, 2024

Introduction

Migraine patients may show similar clinical characteristics of pain, although headache-related disability and how these individuals cope with pain and adapt to their treatment are extensively different (1,2). As a chronic neurological disorder, it has been suggested that some psychological and behavioral issues must be addressed for any patient to successfully manage their headaches. Among these factors are cognitive beliefs such as self-efficacy (SE) and locus of control (LOC) about headache pain and management (3). Furthermore, psychiatric comorbidities and coping styles, such as pain catastrophizing, have also been intervention targets alongside with pharmacological treatment (4).

In the headache field, SE refers to individual´s perception of their ability to take actions to prevent and to manage headaches and headache-related disability (5). LOC concerns to individual's perception that their headache is determined mainly by internal factors such as his own behavior, or external factors, such as health care professionals or chance (hormonal fluctuations, genetically inherited vulnerability, etc.) (6). Pain catastrophizing is broadly conceived as a tendency to magnify the threat value of pain stimulus (magnification), feel helpless in the context of pain (helplessness), and a relative inability to inhibit pain-related thoughts in anticipation of a painful encounter (rumination) (7). In addition, pain catastrophizing represents an independent risk factor for predicting chronicity of pain and poorer prognosis (8) and has been associated with anxiety, depression, and suicidal ideation in headache patients (9–11).

It has been pointed out the high prevalence of comorbidities between migraine and psychiatric disorders, mainly mood and anxiety disorders (12). Although psychiatric comorbidities can be observed in all migraine patients, chronic patients are approximately twice as likely to show depression and anxiety compared to episodic migraine patients (13).

There is a lack of studies investigating more comprehensively the associations between the modifiable psychological factors in migraine, present mainly in its chronic form. These psychological variables summarize the emotional (depression and anxiety) and cognitive (beliefs) domains of the Biopsychosocial model proposed by Gatchel, Bo Peng, Peters, Fuchs and Turk (14), widely accepted as a heuristic model for understanding chronic pain. To date, the way these variables are correlated is not fully elucidated.

The aim of the present study is to investigate the associations between migraine patients' cognitions (self-efficacy, locus of control, cognitive distortions), depression, anxiety, psychopathological symptoms, headache frequency, headache severity, and headache-related disability in migraine patients. Furthermore, the study aims to compare study measures between episodic and chronic migraine patients.

Methods

Sample and Procedure

The sample was composed of 147 patients with a migraine diagnosis made by experienced neurologists according to International Classification of Headache Disorders 3rd Edition - Beta version (2013) (15). Exclusion criteria were having difficulties filling out any instrument or the patient lacking time. The age of participants ranged from 18 to 65 years old. Patients were selected among the outpatients registered at two public and one private hospitals in Southern Brazil. The instruments were applied on one occasion, on the same day of patients' routine doctor's appointment.

Data collection

A semistructured interview were held to characterize the sample and to evaluate clinical headache parameters, such as duration of disorder in years (DD), time patient has been in treatment (DT), headache frequency in the last three months (HF), and headache intensity attributed by the participants to their pain in the last three months in a scale ranging from 0–10 (HI). The Headache-related Cognitive Distortions Questionnaire (HCDQ) was used to investigate primary headache patients´ cognitive distortions about their headaches and headache treatment (16). The Headache Management Self-Efficacy Scale (HMSE) (17) and Headache-Specific Locus of Control Scale (HSLC) (18) were applied to evaluate, respectively individual´s perception of their ability to take actions to prevent and to manage headaches and headache-related disability and individual's perception that their headache is determined mainly by internal factors such as his own behavior, or external factors, such as health care professionals or chance. Headache-Specific Locus of Control Scale (HSLC) is a single questionnaire evaluating the three types of LOC. The first section of the Self-Reporting Questionnaire (SRQ) was used to screen psychiatric disorders (19). The impact of headaches on usual daily activities was evaluated by the Headache Impact Test (HIT-6) (20). The Pain Catastrophizing Scale (PCS) (21) was applied to measure catastrophization as cognitive and emotional response to pain. Furthermore, depression and anxiety symptoms were evaluated by the Patient Health Questionnaire (PHQ-9) (22) and Generalized Anxiety Disorder 7 (GAD-7) (23), respectively.

Ethical aspects

All the participants gave their informed consent prior to their inclusion in the study. The study received the approval by each Hospital's ethics committee.

Data Analysis

Data distribution was verified using Kolmogorov-Smirnov

test. Pearson correlations were used to investigate the correlations between study measures. Student´s T-tests were conducted to compare patients with chronic and episodic migraine in the beliefs of self-efficacy, locus of control and cognitive distortions. Effect size was calculated using the Cohen's D index. Statistical Package for Social Sciences (SPSS) version 22 was used, adopting a 5% significance level.

Results

A total of 147 patients from the three headache centers were included. Because some patients could not fill out all the instruments, the number os patients included in the calculation varied from 135 to 147 in each measure. Mean age of the sample was 44.05 years old (DP=12.80), 89.1% was female, 70% studied up to high school, 57.1% had an income until 3 minimum wages and 46.9% was employed.

Descriptive Statistics for Study Measures are presented in Table 1. Even considering sample variability, patients scored above clinical cutoff points in depression, anxiety and pain catastrophizing mean scores. A comparison among the average levels of patients' beliefs (self-efficacy, locus of control, cognitive distortions) in patients with chronic and episodic migraine, are shown at Table 2. Significant differences were observed in both domains of cognitive distortions (pain and treatment), self-efficacy and chance locus of control. The effect size of those differences ranged from d=0.41 to 0.89, showing that the groups presented different profiles regarding such variables. The difference in HCDQ 2 was the largest one found (d = 0.89), pointing that chronic migraine patients have more cognitive distortions about their headache treatment compared to episodic migraine patients.

Table 1. Descriptive Statistics of Study Measures

Measure	Mean (SD)	Range	Number of patients
HCDQ-1	23.01(8.12)	32	136
HCDQ-2	16.46 (6.33)	28	136
HMSE- 10	43.84 (13.34)	60	135
LOC I	37.49 (9.74)	44	136
LOC P	40.84 (6.06)	26	136
LOC C	31.62 (9.21)	44	136
PHQ-9	10.27(6.65)	27	136
GAD-7	10.22(6.16)	21	139
PCS	42.76(12.04)	46	135
HIT-6	62.03 (7.90)	38	137
DD	22.67 (14.89)	54	147
DT	9.91 (10.45)	46	147
HF	28.97 (24.98)	90	147
HI	8.23 (1.95)	10	145

Note. SD standard deviation, HCDQ-1 Pain Subscale, HCDQ- 2 Treatment Subscale, HMSE-10 Headache Management Self-Efficacy Scale, LOC I Internal locus of control; LOC P Health care professionals locus of control; LOC C Chance locus of control PHQ-9 Patient Health Questionnaire 9, GAD-7 Generalized Anxiety Disorder, PCS Pain Catastrophization Scale; HIT-6 Headache Impact Test, DD duration of disorder in years, DT time patient has been in treatment, HF headache frequency in the last three months, HI headache intensity attributed by the participants to their pain in the last three months in a scale ranging from 0–10

Table 2. Study measures means in chronic, episodic migraine and group comparisons

Measures	Mean (SD)		t value (df); Cohen's d [CI95%]
	CM(n=103)	EM(n=33)	
HCDQ-1	25.52(7.90)	22.20(8.06)	t = −2.06 (134); p < .05; d = .41[.02 to .80]
HCDQ-2	20.67(6.85)	15.11(5.54)	t = 1.94 (134); p < .001; d = .89 [.53 to 1.35]
HMSE-10	37.97(15.18)	45.74(12.17)	t = -2.99 (133); p < .05; d = -.56 [-1.00 to -0.19]
LOC-1	35.59(10.36)	38.08(9.52)	t = -1.26 (134); p > .05; d= -.25 [-.65 to 0.14]
LOC-P	39.97(5.36)	41.11(6.26)	t = -.93 (134); p>.05; d=-.20 [-.58 to .21]
LOC-C	35.81(9.50)	30.33(8.77)	t = 3.03 (134); p < .05; d = 0.60 [.21 to 1.02]

Note. SD standard deviation, CI confidence interval, CM Chronic migraine; EM Episodic migraine; HCDQ-1 Pain Subscale; HCDQ- 2 Treatment Subscale; HMSE-10 Headache Management Self-Efficacy Scale, LOC I Internal locus of control; LOC P Health care professionals locus of control; LOC C Chance locus of control,

Among sociodemographic variables, age was positively correlated with LOC P (r=.27; p<.001) and negatively correlated with pain catastrophizing (r=-.18; p<.05). Educational level was negatively correlated with LOC C (r=-.31; p<.001). No other correlations between sociodemographic variables and study measures were observed. Correlations between study measures are shown on Table 3.

Both HCDQ subscales (HCDQ-1 and HCDQ-2) showed significant positive correlation with almost all psychological and clinical measures, including psychopathological symptoms, depression, anxiety, pain catastrophizing, headache-related disability, headache frequency and headache intensity. The strength of these correlations ranged from mild to moderate, highlighting the one considered "strong" between pain catastrophizing and cognitive distortions related to pain (HCDQ-1). In turn, both HCDQ subscales were negatively correlated with self-efficacy beliefs (HMSE-10).

Self-efficacy beliefs correlated negatively with all clinical measures, including psychopathological symptoms, depression, anxiety, pain catastrophizing, headache-related disability, headache frequency and headache intensity. In turn, SE was positively correlated with LOC I, in a moderate strength (r=.44).

Among the three LOCs, LOC C was the one most significantly associated with other study measures. LOC C correlated positively with depression, anxiety, psychopathological symptoms, pain catastrophizing, headache-related disability, and headache intensity.

As already expected, depression, anxiety, psychopathological symptoms, and pain catastrophizing were all significantly correlated between each other and with all study measures, underscoring the strength of approximation of these variables in migraine patients and reinforcing the importance of evaluating them during clinical e research practice.

Discussion

In the present study, chronic migraine patients have shown higher levels of cognitive distortions regarding pain and treatment (HCDQ-1 and HCDQ-2), and LOC C compared to episodic migraine patients. In turn, episodic migraine patients have shown higher levels of self-efficacy beliefs compared to chronic migraine patients. Although it is not possible to draw a causal relationship due to the transversal design of the present study, these results reinforce the association between psychological factors and with headache chronicity. In a study conducted by Seng et al. (24), chance locus of control was one of the psychological factors associated with chronic migraine (OR = 1.85, 95% CI = 1.13, 1.43). In addition, Radat et al (25) found that among psychological variables associated with chronicity include the use of catastrophizing and an externalized locus of control. Fortunately, cognitive distortions, LOC C and lower self-efficacy beliefs are modifiable psychological risk factors of chronic migraine, having been the subject of previous clinical trials with good post-intervention results (26).

Along with depression, anxiety and psychopathological symptoms, all cognitive factors (cognitive distortions, SE and LOC beliefs) were significantly associated with headache-related disability. These results add evidence to the associations between pain beliefs and the headache-related disability in headache patients (27).

There were several significant correlations between migraine patient's beliefs. SE beliefs were positively associated with LOC I and negatively associated with LOC C, in a correlation of moderate strength. At the same

Table 3. Correlations between study measures

Measures	1	2	3	4	5	6	7	8	9	10	11	12	13
1-HCDQ-1	-												
2-HCDQ-2	**.42****												
3-HMSE-10	**-.45****	**-.38****											
4-LOC I	.04	-.11	**.44****										
5- LOC P	**.18***	-.14	.09	**.18***	-								
6-LOC C	**.53****	**.45****	**-.48****	**-.19***	.12	-							
7-PHQ-9	**.48****	**.32****	**-.23****	.12	.06	**.44****	-						
8-GAD-7	**.49****	**.36****	**-.21***	**-.23****	.05	**.35****	**.69****	-					
9-SRQ	**.48****	**.25****	**-.21***	.17	.14	**.42****	**.78****	**.60****	-				
10- PCS	**.71****	**.22***	**-.36****	.10	.07	**.37****	**.41****	**.49****	**.41****	-			
11-HIT-6	**.53****	**.27****	**-.34****	.04	.07	**.41****	**.55****	**.43****	**.52****	**.45****	-		
12-HF	**.21***	**.44****	**-.25****	-.06	-.09	**-.23****	**.24****	**.20***	**.23****	**.15**	**.30****	-	
13-HI	**.31****	**.19***	**-.19***	.09	.07	**.27****	**.30****	**.26****	**.32****	**.26****	**.49****	**.02**	-

*p<0,05; **p<0,01. HCDQ-1 Headache-related Cognitive Distortions Questionnaire- Pain Subscale; HCDQ-2 Headache-related Cognitive Distortions Questionnaire - Treatment Subscale, HMSE-10 Headache Management Self-Efficacy Scale-10, LOC I Internal locus of control; LOC P Health care professionals locus of control; LOC C Chance locus of control; SRQ Self-Reporting Questionnaire, PHQ-9 Patient Health Questionnaire 9, GAD-7 Generalized Anxiety Disorder, PCS Pain Catastrophization Scale, HIT-6 Headache Impact Test, HF headache frequency, HI headache intensity

time, SE beliefs were negatively correlated with cognitive distortion, in both subscales Pain (moderate) and Treatment (mild). The association between SE and LOC beliefs in headache patients are in line with previous studies (5). Peres et al. (28) found that pessimism, but not optimism, was a significant predictor of migraine, while optimism served as a protective factor against migraine-related disability, even after controlling for anxiety scores. Anxiety, as the strongest predictor of migraine was associated with specific symptoms such as rumination, trouble relaxing, feeling nervous, and worrying excessively—symptoms that overlap with pain catastrophizing components like magnification and helplessness. Behavioral interventions like cognitive behavioral therapy (CBT) can moderate optimism and pessimism, highlighting their modifiable nature. The association between SE beliefs and cognitive distortions identified in our study may similarly point to opportunities for intervention aimed at reducing negative cognitive patterns in headache patients.

Furthermore, research by Jegindø et al. (29) suggests that positive expectations can significantly influence pain perception. This finding aligns with the protective role of optimism observed in migraine-related disability (28). It highlights how expectancy effects, whether derived from dispositional optimism or other belief systems, may modulate the experience of pain. The potential interaction between positive expectancy (e.g., optimism or prayer-induced expectations) and SE beliefs suggests an avenue for further exploration in migraine management. By fostering SE beliefs and optimism, clinicians may help patients better manage their pain and reduce disability. Our data suggest that pessimistic beliefs that "something can go wrong" or "good things rarely happen," may undermine SE and contribute to cognitive distortions, exacerbating headache-related disability. In contrast, optimistic beliefs, such as expecting good outcomes, might bolster SE and reduce the impact of distortions. Whether optimism and pessimism operate independently or as a single construct remains debated. Still, our findings contribute to the understanding of these relationships by illustrating how they may influence migraine outcomes through interconnected psychological pathways.

Previous studies have examined the association between SE beliefs and pain catastrophizing (30,31), which is composed by rumination, magnification, and helplessness domains. According to appraisal model, helplessness may be related to a secondary appraisal process in which individuals negatively evaluate their ability to deal with painful stimuli (32). In this sense, our finding reinforces this association since SE were negatively associated with HCDQ-1 subscale, which present thoughts of helplessness such as "I feel so helpless when I have a

headache that I believe nothing will bring me relief." or Once my headache starts, I know that my day is lost". It is possible that SE beliefs might be buffering the feeling of helplessness in pain catastrophizing. Still, the association between SE beliefs and cognitive distortions represents an original result, as far as we know. Despite the theoretical attention paid to pain catastrophizing in migraine patients, to our knowledge, the association between SE beliefs and other cognitive distortions such as emotional reasoning, labeling, discounting the positives, mental filter, jumping to conclusions, and overgeneralization have not been evaluated previously, even though have already been identified in headache patients (20).

To better understand our findings, a return to conceptual questions is necessary. LOC beliefs concern the degree to which an individual perceives that an event is under his/her personal control. SE beliefs refer to patient's confidence that they can take actions to prevent headache episodes or manage headache-related pain and disability. Cognitive distortions are systematic errors in the perception and processing of information of reality, occurring even without objective evidence supporting the contrary.

It is possible that successes in headache management tend to increase SE beliefs if they are interpreted as resulting from a skill permeated by the control of the individual (LOC I), rather than being attributed merely to external causes, mainly chance (LOC C). At the same time, SE beliefs will rely on the judgment of the individual, which may contain cognitive distortions, which hinder the strengthening of these beliefs. Thus, achieving satisfactory task performance, while contributing to the development of the SE, may not be sufficient to establish this belief. As examples, these patients by revealing thoughts such as the ones presented in HCDQ "If my headache treatment failed today, it will always fail (overgeneralization); I will not know what to do if I have a headache" (catastrophizing) or "The negative aspects of my headache treatment call me more attention than the positive ones" (discounting the positives), can have their SE headache management significantly diminished by these distortions. When including psychological interventions to improve self-efficacy beliefs it should always consider the difference between episodic and chronic headaches, where the patient has already experienced multiple difficulties in getting out of the crisis. Patients' headache management history and their experiences with difficulties in getting out of the crisis should always be assessed to deepen the understanding the reasons self-efficacy beliefs and inability to manage the pain had become low over time.

Based on these results, we propose that clinical interventions for headache management should adopt a biopsychosocial approach, addressing not only the physical symptoms but also the cognitive and psychological dimensions that contribute to the patient's experience. Specifically, interventions should: 1) focus on fostering a balance among the three locus of control (internal, external, and professional), which promotes coping strategies to reduces headache-related distress; 2) enhance self-efficacy beliefs, as higher self-efficacy has been shown to buffer the effects of stress and improve headache management outcomes (33,34); and 3) identify and restructure maladaptive cognitive distortions about pain and treatment using cognitive-behavioral techniques. Attention should be paid to the integration of strategies that support emotional regulation and cognitive reappraisal, which can mitigate fear, pain catastrophizing, stigma, and ultimately improve the overall quality of life for patients.

The present study has some limitations that should be mentioned. First, it is possible to have a regional focus since patients were recruited from headache units only in Southern Brazil. Second, migraine was the only primary headache diagnosis included in the study. Moreover, these results should be seen with caution since there are other factors to be considered when evaluating patients' beliefs such as disease and treatment knowledge, cognitive responses to pain, depression and anxiety scores, perceived social support, among others. Future investigations with patients from diverse regions of Brazil, people who are not in routine treatment, and with inclusion of other primary headache diagnoses such as tension-type headache, could decrease the selection bias of the sample.

Conclusion

Our findings join to a substantial body of evidence suggesting that patients' cognitive and emotional responses to their headaches are associated with headache-related disability and chronicity. Furthermore, they enhance the validity of Biopsychosocial approach to chronic pain and underscore the importance of examining and treating these psychological factors to prevent headache chronicity and improve headache management.

References

1. Hartberg S, Clench-Aas J, Raanaas RK, Lundqvist C. Coping strategies among adolescents with chronic headache and mental health problems: a cross-sectional population-based study. Springerplus. 2015 Dec 22;4(1):801. Doi: 10.1186/s40064-015-1599-x
2. Rashid-Tavalai Z, Bakhshani NM, Amirifard H, Lashkaripour M. Effectiveness of Combined Copying Skills Training and Pharmacological Therapy for Patients with Migraine. Glob J Health Sci. 2015 Nov 5;8(6):179. Doi: 10.5539/gjhs.v8n6p179
3. Nicholson RA. Chronic Headache: The Role of the Psychologist. Curr Pain Headache Rep. 2010 Feb 27;14(1):47–54. Doi: 10.1007/s11916-009-0087-9

4. Thorn BE, Pence LB, Ward LC, Kilgo G, Clements KL, Cross TH, et al. A Randomized Clinical Trial of Targeted Cognitive Behavioral Treatment to Reduce Catastrophizing in Chronic Headache Sufferers. J Pain. 2007 Dec;8(12):938–49. Doi: 10.1016/j.jpain.2007.06.010
5. French DJ, Holroyd KA, Pinell C, Malinoski PT, O'donnell F, Hill KR. Perceived Self-efficacy and Headache-Related Disability. Headache: The Journal of Head and Face Pain. 2000 Sep 25;40(8):647–56. Doi: 10.1046/j.1526-4610.2000.040008647.x
6. Martin NJ, Holroyd KA, Penzien DB. The Headache-Specific Locus of Control Scale: Adaptation to Recurrent Headaches. Headache: The Journal of Head and Face Pain. 1990 Nov 20;30(11):729–34. Doi: 10.1111/j.1526-4610.1990.hed3011729.x
7. Quartana PJ, Campbell CM, Edwards RR. Pain catastrophizing: a critical review. Expert Rev Neurother. 2009 May 9;9(5):745–58. Doi: 10.1586/ern.09.34
8. Leung L. Pain Catastrophizing: An Updated Review. Indian J Psychol Med. 2012 Jul 1;34(3):204–17. Doi: 10.4103/0253-7176.106012
9. Drahovzal DN, Stewart SH, Sullivan MJL. Tendency to Catastrophize Somatic Sensations: Pain Catastrophizing and Anxiety Sensitivity in Predicting Headache. Cogn Behav Ther. 2006 Dec;35(4):226–35.Doi: 10.1080/16506070600898397
10. Buenaver LF, Edwards RR, Smith MT, Gramling SE, Haythornthwaite JA. Catastrophizing and Pain-Coping in Young Adults: Associations With Depressive Symptoms and Headache Pain. J Pain. 2008 Apr;9(4):311–9. Doi: 10.1016/j.jpain.2007.11.005
11. Rathod H. Headache Disability, Suicidality and Pain Catastrophization - Are They Related. Journal Of Clinical and Diagnostic Research. 2016; Doi: 10.7860/JCDR/2016/22636.8772
12. Antonaci F, Nappi G, Galli F, Manzoni GC, Calabresi P, Costa A. Migraine and psychiatric comorbidity: a review of clinical findings. J Headache Pain. 2011 Apr 6;12(2):115–25. Doi: 10.1007/s10194-010-0282-4
13. Buse DC, Manack A, Serrano D, Turkel C, Lipton RB. Sociodemographic and comorbidity profiles of chronic migraine and episodic migraine sufferers. J Neurol Neurosurg Psychiatry. 2010 Apr 1;81(4):428–32. Doi: 10.1136/jnnp.2009.192492
14. Gatchel RJ, Peng YB, Peters ML, Fuchs PN, Turk DC. The biopsychosocial approach to chronic pain: Scientific advances and future directions. Psychol Bull. 2007;133(4):581–624. Doi: 10.1037/0033-2909.133.4.581
15. Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition. Cephalalgia. 2018 Jan 25;38(1):1–211. Doi: 10.1177/0333102417738202
16. Vieira RV de A, Peterlin BL, Kowacs F, Londero RG, Barea LM, Grassi V, et al. Headache-related cognitive distortions questionnaire. Headache Medicine. 2022 Mar 24;12(4):309–16. Doi: 10.48208/HeadacheMed.2021.51
17. Vieira RV de A, Kowacs F, Londero RG, Barea LM, Grassi V, Ligório IS, et al. Brazilian version of headache management self-efficacy scale. Headache Medicine. 2021 Nov 16;12(3):247–54. Doi: 10.48208/HeadacheMed.2021.36
18. Vieira RV de A, Kowacs F, Londero RG, Barea LM, Grassi V, Rodrigues Leb, et al. Who is in charge when I have a headache? Brazilian version of the Headache-Specific Locus of Control Scale. Arq Neuropsiquiatr. 2021 Mar;79(3):222–8. Doi: 10.1590/0004-282x-anp-2019-0439
19. de Jesus Mari J, Williams P. A Validity Study of a Psychiatric Screening Questionnaire (SRQ-20) in Primary Care in the city of Sao Paulo. British Journal of Psychiatry. 1986 Jan 29;148(1):23–6. Doi: 10.1192/bjp.148.1.23
20. Martin M, Blaisdell B, Kwong JW, Bjorner JB. The Short-Form Headache Impact Test (HIT-6) was psychometrically equivalent in nine languages. J Clin Epidemiol. 2004 Dec;57(12):1271–8. Doi: 10.1016/j.jclinepi.2004.05.004
21. Sehn F, Chachamovich E, Vidor LP, Dall-Agnol L, Custódio de Souza IC, Torres ILS, et al. Cross-Cultural Adaptation and Validation of the Brazilian Portuguese Version of the Pain Catastrophizing Scale. Pain Medicine. 2012 Nov 1;13(11):1425–35. Doi: 10.1111/j.1526-4637.2012.01492.x
22. de Lima Osório F, Vilela Mendes A, Crippa JA, Loureiro SR. Study of the Discriminative Validity of the PHQ-9 and PHQ-2 in a Sample of Brazilian Women in the Context of Primary Health Care. Perspect Psychiatr Care. 2009 Jul;45(3):216–27. Doi: 10.1111/j.1744-6163.2009.00224.x
23. Löwe B, Decker O, Müller S, Brähler E, Schellberg D, Herzog W, et al. Validation and Standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the General Population. Med Care. 2008 Mar;46(3):266–74. Doi: 10.1097/MLR.0b013e318160d093
24. Seng EK, Buse DC, Klepper JE, J. Mayson S, Grinberg AS, Grosberg BM, et al. Psychological Factors Associated With Chronic Migraine and Severe Migraine-Related Disability: An Observational Study in a Tertiary Headache Center. Headache: The Journal of Head and Face Pain. 2017 Apr 31;57(4):593–604. Doi: 10.1111/head.13021
25. Radat F, Lantéri-Minet M, Nachit-Ouinekh F, Massiou H, Lucas C, Pradalier A, et al. The GRIM2005 Study of Migraine Consultation in France. III: Psychological Features of Subjects With Migraine. Cephalalgia. 2009 Mar 1;29(3):338–50. Doi: 10.1111/j.1468-2982.2008.01718.x
26. Seng EK, Holroyd KA. Behavioral Migraine Management Modifies Behavioral and Cognitive Coping in People With Migraine. Headache: The Journal of Head and Face Pain. 2014 Oct 18;54(9):1470–83. Doi: 10.1111/head.12426

27. Craner JR, Gilliam WP, Sperry JA. Rumination, Magnification, and Helplessness. Clin J Pain. 2016 Dec;32(12):1028–35. Doi: 10.1097/AJP.0000000000000355
28. Peres MFP, Oliveira AB, Mercante JP, Kamei HH, Tobo PR, Rozen TD, et al. Optimism, Pessimism, and Migraine: A Cross-Sectional, Population-Based Study. Headache: The Journal of Head and Face Pain. 2019 Feb 19;59(2):205–14. Doi: 10.1111/head.13471
29. Jegindø EME, Vase L, Skewes JC, Terkelsen AJ, Hansen J, Geertz AW, et al. Expectations contribute to reduced pain levels during prayer in highly religious participants. J Behav Med. 2013 Aug 7;36(4):413–26. Doi: 10.1007/s10865-012-9438-9
30. Ferreira-Valente MA, Pais-Ribeiro JL, Jensen MP. Associations Between Psychosocial Factors and Pain Intensity, Physical Functioning, and Psychological Functioning in Patients With Chronic Pain. Clin J Pain. 2014 Aug;30(8):713–23. Doi: 10.1097/AJP.0000000000000027
31. McKnight PE, Afram A, Kashdan TB, Kasle S, Zautra A. Coping self-efficacy as a mediator between catastrophizing and physical functioning: treatment target selection in an osteoarthritis sample. J Behav Med. 2010 Jun 23;33(3):239–49. Do: 10.1007/s10865-010-9252-1
32. Sullivan MJL, Thorn B, Haythornthwaite JA, Keefe F, Martin M, Bradley LA, et al. Theoretical Perspectives on the Relation Between Catastrophizing and Pain. Clin J Pain. 2001 Mar;17(1):52–64. Doi: 10.1097/00002508-200103000-00008
33. Heath RL, Saliba M, Mahmassani O, Major SC, Khoury BA. Locus of control moderates the relationship between headache pain and depression. J Headache Pain. 2008 Oct 5;9(5):301–8. Doi: 10.1007/s10194-008-0055-5
34. Estave PM, Margol C, Beeghly S, Anderson R, Shakir M, Coffield A, et al. Mechanisms of mindfulness in patients with migraine: Results of a qualitative study. Headache: The Journal of Head and Face Pain. 2023 Mar 28;63(3):390–409. Doi: 10.1111/head.14481

Rebeca Veras de Andrade Vieira
https://orcid.org/0000-0003-2907-8699
Juliane Prieto Peres Mercante
https://orcid.org/0000-0003-2383-289X
Talita Souza Perboni
https://orcid.org/0009-0006-0731-2586
Walkyria Busato Will
https://orcid.org/0009-0005-0146-9112
Murilo Ricardo Zibetti
https://orcid.org/0000-0002-8934-5640
William Barbosa Gomes
https://orcid.org/0000-0001-9069-2685
Gustavo Gauer
https://orcid.org/0000-0002-8536-9493

Authors Contributions: RVAV contributed with recruitment of patients, data collection, data analysis, and manuscript preparation. JPPM, TSP and WBW contributed with manuscript intellectual content and preparation. MRZ contributed with data analysis, discussion of results and manuscript preparation. WBG contributed with the study design, discussion of results and manuscript preparation. GG contributed with the study design, data analysis, discussion of results and manuscript preparation. All authors read and approved the final manuscript.

Declaration of conflicting interests: There are no conflicts of interest regarding the submission and eventual publication of the article

Funding: We thank financial support from CAPES Foundation, Process n. 0598/13-5 through the first author's doctoral fellowship. This research did not receive any other specific grant from funding agencies in the public, commercial, or not-for-profit sectors.