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THE ASSOCIATION BETWEEN MINDFULNESS AND PAIN CATASTROPHIZING AMONG MIGRAINE PATIENTS

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ABSTRACT

Objectives. Migraine is one of the most prevalent neurological disorders worldwide, affecting 14–15% of the global population and causing a substantial psychological burden, particularly when pain is catastrophized. This study examined the association between mindfulness and pain catastrophizing in migraine and assessed associations with age and differences by education and gender.

Methods. This cross-sectional correlational study included 324 participants with diagnosed migraine aged 18–68; 92.6% were women. Mindfulness (observing, describing, acting with awareness, nonjudging, and nonreactivity) was measured using Baer et al.'s Five Facet Mindfulness Questionnaire, and pain catastrophizing was measured using Sullivan et al.'s Pain Catastrophizing Scale. Spearman's correlation was used to examine associations, and Welch's t-test and the Mann–Whitney U test were used for group comparisons.

Results. In the migraine sample, mindfulness was moderately negatively associated with pain catastrophizing ($r = -0.32$, $p < 0.001$). Associations differed across mindfulness facets. Describing ($r = -0.24$, $p < 0.001$), nonreactivity ($r = -0.15$, $p < 0.01$), and acting with awareness ($r = -0.23$, $p < 0.001$) showed weak negative associations; nonjudging showed the strongest moderate negative association ($r = -0.39$, $p < 0.001$), whereas observing showed a weak positive association ($r = 0.12$, $p < 0.05$). Age was weakly positively correlated with mindfulness ($r = 0.26$, $p < 0.001$). Women reported higher pain catastrophizing than men ($t(26.19) = 4.00$, $p < 0.01$, $d = 0.88$), whereas men scored slightly higher on mindfulness ($t(34.30) = -2.33$, $p = 0.03$, $d = 0.38$). These results should be interpreted cautiously due to the small male subsample. No differences in total scores by education level were found.

Conclusions. These findings support an association between mindfulness and pain catastrophizing in migraine, with facet-specific directions, and may inform non-pharmacological support, including psychological counselling, psychoeducation, and the cautious adaptation of mindfulness-based approaches.

Keywords: *migraine, mindfulness, mindfulness facets, non-pharmacological support, pain catastrophizing*

Introduction

Migraine is one of the most prevalent neurological disorders worldwide and represents a substantial public health burden, affecting more than one billion people globally (Amiri et al., 2022). Headache disorders remain among the leading causes of non-fatal health loss worldwide, ranking sixth among all causes of years lived with disability in the Global Burden of Disease Study 2023 (GBD 2023 Disease and Injury and Risk Factor Collaborators, 2025). Although tension-type headache is more prevalent, migraine accounts for the majority of headache-related disability and contributed approximately 40.9 million years lived with disability globally in 2023 (GBD 2023 Headache Collaborators, 2025). Epidemiological studies suggest that migraine affects approximately 14–15% of the global population (Steiner & Stovner, 2023; Stovner et al., 2022). Data from Latvia indicate a similar pattern, with age-adjusted one-year prevalence of definite migraine estimated at 14.0% overall and reaching 23.6% when probable migraine is also included (Mekša et al., 2025).

Migraine is not limited to headache attacks alone. It is a common disabling primary headache disorder that can include prodromal and postdromal symptoms in addition to the headache phase (Headache Classification Committee of the International Headache Society, 2018). Migraine-related burden can extend beyond attacks, affecting daily activities, work and career participation, family and social relationships, emotional well-being, and the ability to plan everyday life (Lo et al., 2022). Symptoms associated with migraine may also persist between attacks, including sensory hypersensitivity, photophobia, phonophobia, osmophobia, and visual or vestibular disturbances; together with concerns about future attacks, these symptoms may contribute to persistent interictal burden (Vincent et al., 2022). In addition, anxiety and depression are common comorbidities among adults with migraine and are associated with poorer health-related quality of life, especially when both conditions are present (Alwhaibi et al., 2023).

One psychological process that is especially relevant in pain and migraine research is pain catastrophizing. Pain catastrophizing refers to an exaggerated negative mental set that occurs during actual or anticipated painful experience and is conceptualized as consisting of rumination, magnification, and helplessness (Sullivan et al., 1995; Sullivan et al., 2001). In migraine patients, pain catastrophizing has been associated with migraine severity and comorbid anxiety and depression (Alvarez-Astorga et al., 2021). Higher levels of pain catastrophizing have also been reported among patients with chronic migraine compared with those with episodic migraine and healthy controls (Pistoia et al., 2022), and recent work suggests that pain catastrophizing may contribute to migraine-related disability within the fear-avoidance model (Fox et al., 2026). Therefore, pain catastrophizing can be considered an important cognitive-affective factor in migraine-related pain experience and psychological support.

Mindfulness may be relevant to pain-related cognitive and emotional processes. Mindfulness has been described as paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally (Kabat-Zinn, 1994). In the Five Facet

Mindfulness Model, mindfulness is conceptualized as a multidimensional construct consisting of observing, describing, acting with awareness, nonjudging of inner experience, and nonreactivity to inner experience (Baer et al., 2006). Analysing mindfulness at the facet level is important because different facets may relate differently to pain-related cognitive and emotional outcomes. In chronic pain, nonjudging and acting with awareness have shown particularly strong negative associations with pain catastrophizing (Aguerre et al., 2025).

The relationship between mindfulness and pain catastrophizing can be understood within the fear-avoidance model of pain. According to this model, catastrophic interpretations of pain may contribute to fear of pain, increased attention to threat, avoidance, functional limitations, and disability (Asmundson et al., 2004; Vlaeyen & Linton, 2000). In a modified version of this model, dispositional mindfulness was placed before pain catastrophizing, and higher mindfulness was associated with lower pain catastrophizing, which in turn was associated with lower pain intensity and pain sensitivity (Wilson et al., 2023). These findings suggest that pain catastrophizing may be one pathway through which dispositional mindfulness is associated with pain-related outcomes.

Previous studies generally support a negative association between mindfulness and pain catastrophizing in general and chronic pain populations. In a chronic pain sample that included patients with migraine and tension-type headache, total mindfulness was negatively associated with pain catastrophizing, with the strongest negative associations found for nonjudging and acting with awareness (Aguerre et al., 2025). In patients with chronic headache and migraine, higher mindfulness was associated with lower negative affect, pain catastrophizing, fear of pain, and pain hypervigilance (Komandur et al., 2018). However, migraine-specific findings remain limited and partly inconsistent. In patients with episodic migraine, total mindfulness was not significantly associated with pain catastrophizing, although the nonjudging facet was negatively associated with the magnification component of pain catastrophizing (Hunt et al., 2022).

To date, evidence on the association between mindfulness, its specific facets, and pain catastrophizing in migraine-specific samples remains limited. This gap is important because migraine represents a distinct pain condition, and findings from broader chronic pain or headache samples may not fully capture the sensory, functional, and psychological burden experienced by migraine patients. Therefore, the aim of this study was to examine the association between mindfulness and pain catastrophizing among migraine patients. The study also examined associations between the five mindfulness facets and pain catastrophizing, as well as associations with age and differences by gender and education.

Methodology

Participants

A quantitative cross-sectional correlational design was used in this study. The initial dataset included 585 respondents. After applying the inclusion and exclusion criteria,

261 respondents were excluded: 20 respondents did not have migraine, 235 reported migraine-like symptoms but did not have a physician's diagnosis, and six reported another primary neurological or oncological disease that could cause headaches. The final sample consisted of 324 participants with physician-diagnosed migraine.

Participants were aged between 18 and 68 years (M = 37.29, SD = 9.25). The sample consisted predominantly of women (n = 300; 92.6%), while men accounted for 7.4% (n = 24). Most participants had higher education (76.5%), followed by secondary education (22.2%) and basic education (1.2%).

Participants were included in the study if they were at least 18 years old and reported having a physician-diagnosed migraine. Exclusion criteria were age below 18 years, absence of migraine, migraine-like symptoms without a physician's diagnosis, and the presence of another primary neurological or oncological disease that could cause headaches. The sample was recruited using convenience sampling with elements of snowball sampling.

Measures

Sociodemographic data. Participants provided information about their age, gender, and education level. They also answered two questions concerning the presence of migraine and the presence of other primary neurological or oncological conditions that could cause headaches.

Mindfulness. Mindfulness was assessed using the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006), using its Latvian adaptation (Majors, 2013). The questionnaire consists of 39 items and measures five mindfulness facets: observing, describing, acting with awareness, nonjudging, and nonreactivity. Responses are given on a 5-point Likert scale, with higher scores indicating higher levels of mindfulness. In this sample, the total FFMQ score demonstrated good internal consistency (Cronbach's α = .88). Internal consistency was good for observing (α = .78), describing (α = .89), acting with awareness (α = .88), and nonjudging (α = .91), but lower for nonreactivity (α = .60); therefore, results related to this facet should be interpreted with caution.

Pain catastrophizing. Pain catastrophizing was assessed using the Pain Catastrophizing Scale (PCS; Sullivan et al., 1995), pilot-adapted by Veckaktiņa (Veckaktiņa, 2023). Permission to use the Latvian version of the PCS was obtained from Mapi Research Trust. Copyright © 1995 Michael JL Sullivan. The PCS consists of 13 items and includes three subscales: rumination, magnification, and helplessness. Responses are given on a Likert scale from 0 to 4, with higher scores indicating higher levels of pain catastrophizing. PCS contact information and permission to use: Mapi Research Trust, Lyon, France, https://eprovide.mapi-trust.org. In the present sample, the total PCS score demonstrated good internal consistency (Cronbach's α = .91). The internal consistency coefficients were α = .82 for rumination, α = .74 for magnification, and α = .84 for helplessness.

Procedure

The study was approved by the Research Ethics Committee of Rīga Stradiņš University (Decision No. 2-PĒK-4/1317/2025, 8 December 2025). Permission to use the Latvian version of the Five Facet Mindfulness Questionnaire was obtained from the Faculty of Education Sciences and Psychology of the University of Latvia, and permission to use the Pain Catastrophizing Scale was obtained from Mapi Research Trust.

Data were collected between January 9 and February 2, 2026, using an online survey created in Google Forms. The survey was distributed electronically through social media platforms and two migraine patient support groups. Participation was voluntary and anonymous. Before completing the survey, participants provided informed consent and were informed about their right to discontinue participation at any time. To encourage participation, respondents could voluntarily enter a lottery to win a €50 digital gift card for the "Jānis Roze" bookstore.

Data Analysis

Data were analysed using Microsoft Excel 16.105.3 and JASP 0.95.4. Descriptive statistics were calculated for sociodemographic variables and study variables. The normality of distributions was assessed using the Shapiro–Wilk test, as well as visual inspection of histograms and boxplots. Internal consistency of the scales and subscales was assessed using Cronbach's alpha.

Because most study variables did not meet the assumption of normality, Spearman's rank correlation coefficient was used to examine associations between mindfulness, mindfulness facets, pain catastrophizing, and age.

For group comparisons, the assumptions of the selected statistical tests, including the normality of distributions within each group, were evaluated separately. As total mindfulness and pain catastrophizing scores did not significantly deviate from normality within the gender groups, Welch's t-test was used to examine gender differences. This test was selected because of the unequal group sizes and the violation of the homogeneity of variances assumption for total mindfulness. Differences by education were analysed by comparing participants with secondary and higher education, because the basic education group was too small to be included. Welch's t-test or the Mann–Whitney U test was used depending on whether the assumptions for parametric testing were met.

Results

Descriptive Statistics and Normality Testing

Descriptive statistics and normality tests are presented in Table 1. Only total mindfulness did not significantly deviate from normality, whereas most other variables did. Box plots were inspected for possible outliers, and all observed values were retained because they were within the possible scale ranges.

Table 1. Descriptive Statistics for Mindfulness, Mindfulness Facets, and Pain Catastrophizing

Variable	*Mdn*	*M*	*SD*	*IQR*	*Skew.*	*Kurt.*	*W*	*p*	*Min*	*Max*
Mindfulness	127.5	127.96	16.91	24.25	0.06	−0.26	1.00	0.54	81	171
Observing	26.0	25.65	5.61	8.00	−0.35	−0.40	0.98	< 0.01	11	39
Describing	28.0	28.00	5.79	8.00	−0.12	−0.56	0.99	< 0.01	13	40
Acting with awareness	27.0	26.86	5.90	8.00	−0.02	−0.38	0.99	0.03	9	40
Nonjudging	28.5	28.16	6.94	11.00	−0.20	−0.66	0.98	< 0.01	8	40
Nonreactivity	19.0	19.30	3.67	5.00	0.05	0.00	0.99	0.01	10	32
Pain catastrophizing	31.5	30.98	9.43	12.00	−0.30	−0.22	0.99	0.02	4	52

Note. $N = 324$. *M* = mean; *SD* = standard deviation; *Mdn* = median; IQR = interquartile range; Skew. = skewness; Kurt. = kurtosis; W = Shapiro–Wilk test statistic. A significant Shapiro–Wilk test result indicates deviation from normal distribution.

Associations Between Mindfulness, Mindfulness Facets, and Pain Catastrophizing

Spearman's rank correlation coefficient was used to examine associations between mindfulness, mindfulness facets, and pain catastrophizing. The magnitude of the correlation coefficients was interpreted according to conventional benchmarks for effect sizes, where values of approximately .10, .30, and .50 indicate small, medium, and large effects, respectively (Cohen, 1988). The correlation results are presented in Table 2. Total mindfulness showed a moderate statistically significant negative association with pain catastrophizing, $r_s(322) = -0.32$, $p < 0.001$. At the facet level, nonjudging showed the strongest association with pain catastrophizing, indicating a moderate negative association, $r_s(322) = -0.39$, $p < 0.001$. Describing, acting with awareness, and nonreactivity were weakly negatively associated with pain catastrophizing. In contrast, observing showed a weak positive association with pain catastrophizing.

Table 2. Spearman Correlations Between Mindfulness, Mindfulness Facets, and Pain Catastrophizing

Variable	1.	2.	3.	4.	5.	6.	7.
1. Mindfulness	—						
2. Observing	0.28***	—					
3. Describing	0.78***	0.10	—				
4. Acting with awareness	0.69***	−0.10	0.50***	—			
5. Nonjudging	0.70***	−0.18**	0.45***	0.49***	—		
6. Nonreactivity	0.44***	0.20***	0.24***	0.08	0.15**	—	
7. Pain catastrophizing	**−0.32*****	**0.12***	**−0.24*****	**−0.23*****	**−0.39*****	**−0.15****	—

Note. $N = 324$. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

Gender Differences in Mindfulness and Pain Catastrophizing

Gender differences in total mindfulness and pain catastrophizing were examined using Welch's t-test. The normality assumption was met within both gender groups for total mindfulness (Shapiro–Wilk $p = .29$ for women and $p = .72$ for men) and pain catastrophizing (Shapiro–Wilk $p = .06$ for women and $p = .23$ for men). As shown in Table 3, men had a statistically significantly higher total mindfulness score than women, $t(34.30) = -2.33$, $p = 0.03$, $d = 0.38$. Women had a statistically significantly higher total pain catastrophizing score than men, $t(26.19) = 4.00$, $p < 0.01$, $d = 0.88$. These results should be interpreted with caution because the number of men in the sample was small.

Table 3. Gender Differences in Mindfulness and Pain Catastrophizing

Variable	*Group (n)*	*M (SD)*	*Welch's t-test value*	*p*	*Effect size*
Mindfulness	Women ($n = 300$)	127.56 (17.28)	$t(34.30) = -2.33$	0.03*	0.38
	Men ($n = 24$)	133.00 (10.34)			
Pain catastrophizing	Women ($n = 300$)	31.60 (9.12)	$t(26.19) = 4.00$	< 0.01**	0.88
	Men ($n = 24$)	23.21 (9.95)			

Note. $N = 324$. M = mean; SD = standard deviation. Effect size is Cohen's d for Welch's t-tests.

Education Differences in Mindfulness and Pain Catastrophizing

Differences by education were examined by comparing participants with secondary and higher education. Welch's t-test or the Mann–Whitney U test was used depending on whether the assumptions for parametric testing were met. As shown in Table 4, no statistically significant differences were found between the secondary and higher education groups in total mindfulness or total pain catastrophizing. Participants with higher education had a statistically significantly higher score on the describing facet than participants with secondary education; however, this isolated finding should be interpreted with caution, as the effect size was small and multiple comparisons were not adjusted for.

Table 4. Education Differences in Mindfulness and Pain Catastrophizing

Variable	*Group (n)*	*M (SD) or Mdn (IQR)*	*Test*	*Test value*	*p*	*Effect size*
Mindfulness	Higher education ($n = 248$)	128.91 (16.59)	Welch's *t*-test	$t(109.33) = 1.50$	0.14	$d = 0.20$
	Secondary education ($n = 72$)	125.39 (17.80)				
Observing	Higher education ($n = 248$)	26.0 (8.00)	Mann–Whitney U test	$U = 8975.50$	0.95	$r = -0.01$
	Secondary education ($n = 72$)	26.0 (8.00)				
Describing	Higher education ($n = 248$)	29.0 (8.00)	Mann–Whitney U test	$U = 10655.50$	0.01*	$r = -0.19$
	Secondary education ($n = 72$)	26.0 (9.25)				

Variable	Group (n)	M (SD) or Mdn (IQR)	Test	Test value	p	Effect size
Acting with awareness	Higher education (n = 248)	26.96 (5.67)	Welch's t-test	$t(103.83) = 0.51$	0.61	$d = 0.07$
	Secondary education (n = 72)	26.53 (6.55)				
Nonjudging	Higher education (n = 248)	29.0 (11.00)	Mann–Whitney U test	$U = 9792.00$	0.21	$r = -0.10$
	Secondary education (n = 72)	27.0 (9.00)				
Nonreactivity	Higher education (n = 248)	19.5 (5.00)	Mann–Whitney U test	$U = 9043.00$	0.87	$r = -0.01$
	Secondary education (n = 72)	19.0 (4.00)				
Pain catastrophizing	Higher education (n = 248)	31.0 (12.00)	Mann–Whitney U test	$U = 8429.00$	0.47	$r = 0.06$
	Secondary education (n = 72)	32.0 (15.00)				

Note. $N = 320$. Participants with basic education were excluded from group comparisons because of the very small group size ($n = 4$). M = mean; SD = standard deviation; Mdn = median; IQR = interquartile range. Effect size is Cohen's d for Welch's t-tests and rank-biserial correlation r for Mann–Whitney U tests. For Mann–Whitney U tests, the sign of rank-biserial r depends on group ordering.

Associations with Age

Spearman's rank correlation coefficient was used to examine associations between age, mindfulness, mindfulness facets, and pain catastrophizing. The results are presented in Table 5. Age was weakly and positively associated with total mindfulness, $r_s(322) = 0.26$, $p < 0.001$. At the facet level, age was weakly positively associated with acting with awareness, describing, and nonjudging. Age was not significantly associated with pain catastrophizing.

Table 5. Spearman Correlations Between Age, Mindfulness, Mindfulness Facets, and Pain Catastrophizing

Variable	1.	2.	3.	4.	5.	6.	7.	8.
1. Age	—							
2. Mindfulness	0.26^{***}	—						
3. Observing	0.00	0.28^{***}	—					
4. Acting with awareness	0.20^{***}	0.69^{***}	−0.10	—				
5. Describing	0.20^{***}	0.78^{***}	0.10	0.50^{***}	—			
6. Nonjudging	0.25^{***}	0.70^{***}	-0.18^{**}	0.49^{***}	0.45^{***}	—		
7. Nonreactivity	0.01	0.44^{***}	0.20^{***}	0.08	0.24^{***}	0.15^{**}	—	
8. Pain catastrophizing	−0.06	-0.32^{***}	0.12^{*}	-0.23^{***}	-0.24^{***}	-0.39^{***}	-0.15^{**}	—

Note. $N = 324$. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

Discussion

The results indicate an association between mindfulness and pain catastrophizing in individuals with migraine. Higher total mindfulness was associated with lower overall pain catastrophizing, indicating that the way individuals relate to their inner experience may be relevant to how pain is interpreted. This finding is consistent with a biopsychosocial understanding of pain, according to which pain experience and disability are influenced not only by biological mechanisms, but also by psychological and social factors (Gatchel et al., 2007). More specifically, the finding is compatible with a modified version of the fear-avoidance model, in which higher mindfulness was associated with lower pain catastrophizing, which in turn was associated with lower pain intensity and pain sensitivity (Wilson et al., 2023). Although the cross-sectional design of the present study does not allow causal conclusions, the observed association is consistent with previous findings in chronic pain and chronic headache or migraine samples (Aguerre et al., 2025; Komandur et al., 2018). At the same time, migraine-specific findings remain limited and not entirely consistent, as Hunt et al. (2022) did not find a significant association between total mindfulness and pain catastrophizing in patients with episodic migraine.

The facet-level results provide a more nuanced understanding of the association between mindfulness and pain catastrophizing. Nonjudging showed the strongest negative association with pain catastrophizing, whereas describing, acting with awareness, and nonreactivity showed weaker negative associations. Pain catastrophizing is characterized by an exaggerated negative mental set in relation to actual or anticipated pain (Sullivan et al., 2001), whereas nonjudging reflects a tendency to relate to inner experience without evaluating it negatively (Baer et al., 2006). Thus, a less judgmental stance toward pain-related thoughts, emotions, and bodily sensations may be associated with a lower tendency to interpret migraine-related sensations in catastrophic terms. This interpretation is consistent with previous findings linking nonjudging with lower pain catastrophizing or catastrophizing components (Aguerre et al., 2025; Hunt et al., 2022).

In contrast, observing showed a weak positive association with pain catastrophizing. Given the small effect size, this finding should be interpreted cautiously and should not be taken to suggest that observing is maladaptive in itself. Rather, one tentative explanation is that observing, when considered separately from nonjudging and nonreactivity, may partly reflect increased monitoring of internal or sensory experiences. This is consistent with monitoring and acceptance theory, which suggests that monitoring present-moment experience without acceptance may increase emotional reactivity (Lindsay & Creswell, 2017). This interpretation may be particularly relevant in migraine, where sensory hypersensitivity may persist beyond the headache phase and contribute to interictal burden (Vincent et al., 2022). Overall, the positive association between observing and pain catastrophizing should be regarded as preliminary.

The study also found sociodemographic differences. Women reported higher pain catastrophizing than men, whereas men reported slightly higher total mindfulness. These findings should be interpreted cautiously because the sample was highly unbalanced by

gender and included a small number of men. The finding of higher pain catastrophizing among women is broadly consistent with previous pain research reporting sex differences in catastrophizing (Forsythe et al., 2011; Le et al., 2024). This finding may be understood within the broader literature on sex and gender differences in pain, which suggests that women generally experience more pain across the lifespan, including greater pain sensitivity and a higher burden of many chronic pain conditions, compared with men (Keogh, 2022; Osborne & Davis, 2022). However, the gender difference in mindfulness was smaller than the difference in pain catastrophizing. Given the small number of men in the present sample and the mixed evidence on gender differences in mindfulness, this finding should be viewed as preliminary and should not be generalized beyond the present sample.

Education was not associated with significant differences in total mindfulness or pain catastrophizing in the present sample. The absence of total-score differences by education may be considered in light of the limited and mixed evidence on education and mindfulness (Lecuona et al., 2022; Pelegrini et al., 2023), but differs from findings across different chronic pain populations, where lower educational attainment has been associated with higher pain catastrophizing (Shen et al., 2018; Fentazi et al., 2023), greater pain intensity and interference, and higher levels of depression and anxiety (Fentazi et al., 2023, 2025). At the mindfulness facet level, only a small difference was found for describing, with higher scores among participants with higher education. This may reflect a slightly greater self-reported tendency to verbalize inner experience, but the effect was small and should not be overinterpreted. Furthermore, as multiple education-group comparisons were conducted without adjustment for multiple comparisons, this isolated finding should be interpreted with additional caution and requires replication in future studies.

Age showed weak positive associations with total mindfulness and several mindfulness facets, suggesting that older participants reported somewhat higher mindfulness-related capacities. This is broadly consistent with previous findings suggesting higher mindfulness in older adults, which may reflect age-related differences in emotion regulation and acceptance of inner experience (Gan et al., 2023; MacAulay et al., 2022; Mahoney et al., 2015). In contrast, age was not significantly associated with pain catastrophizing in the present sample, although previous studies have suggested age-related differences in pain catastrophizing in chronic or experimentally induced pain contexts (Murray et al., 2021; Petrini & Arendt-Nielsen, 2024). This may reflect the specific nature of migraine as an episodic pain condition with sensory symptoms and interictal burden.

A strength of this study is that it examined a relatively large sample of participants with physician-diagnosed migraine and analysed mindfulness at the facet level. This made it possible to show that the association with pain catastrophizing was not uniform across mindfulness dimensions: the total mindfulness score alone would not have revealed the relatively stronger negative association observed for nonjudging. The study also included sociodemographic variables, allowing a broader understanding of how mindfulness and pain catastrophizing are reflected in this migraine sample.

Several limitations should be considered. The cross-sectional correlational design does not allow conclusions about the direction of the associations. The study also relied on self-report measures, which may be influenced by response tendencies or social desirability. Migraine diagnosis was self-reported, although only participants who reported physician-diagnosed migraine were included. In addition, the sample was recruited using convenience sampling with snowball elements, and participation was supported by a small gift card lottery, which may have influenced participants' motivation to take part. These factors limit generalizability. The substantial gender imbalance further limits the interpretation of gender differences. In addition, multiple statistical tests, including education-group comparisons, were conducted without adjustment for multiple comparisons, increasing the risk of Type I error. Psychometric limitations should also be noted: the nonreactivity facet of the Five Facet Mindfulness Questionnaire showed relatively low internal consistency, and the Latvian version of the Pain Catastrophizing Scale was a pilot-adapted version. Although the total Pain Catastrophizing Scale showed good internal consistency, further validation of the Latvian version is needed. Finally, the analyses did not control for potentially relevant clinical and psychological variables, such as migraine frequency, chronic versus episodic migraine, aura status, medication use, headache-related disability, anxiety, or depression.

Future research would benefit from longitudinal and experimental approaches that could clarify how mindfulness, pain catastrophizing, and migraine-related burden develop and interact over time. It may also be important to examine pain catastrophizing as a possible mechanism linking mindfulness with migraine outcomes, such as headache-related disability. Further studies should distinguish between migraine subtypes, including migraine with and without aura, and account for relevant clinical and psychological factors, such as attack frequency, anxiety, and depression. Qualitative or mixed-methods research could provide additional insight into how people with migraine make sense of pain-related experiences, relate to internal states, and use mindfulness or other non-pharmacological coping strategies when dealing with unpredictable attacks.

Conclusions

The results showed a statistically significant negative association between mindfulness and pain catastrophizing among participants with physician-diagnosed migraine: higher mindfulness was associated with lower overall pain catastrophizing. This suggests that mindfulness may be relevant to how people with migraine cognitively and emotionally relate to pain.

The findings also showed that mindfulness facets were not equally associated with pain catastrophizing. Nonjudging showed the strongest negative association with pain catastrophizing, while describing, acting with awareness, and nonreactivity showed weaker negative associations. In contrast, observing was weakly positively associated with pain catastrophizing. This suggests that noticing internal and external experiences

may not necessarily reflect an adaptive form of mindfulness in migraine if it is not accompanied by a nonjudgmental and less reactive attitude toward inner experience.

Women reported higher pain catastrophizing than men, whereas men showed slightly higher total mindfulness scores; however, these gender differences should be interpreted cautiously due to the small number of men in the sample. No significant differences in total mindfulness or pain catastrophizing were found between participants with secondary and higher education. Age was weakly positively associated with total mindfulness, but it was not significantly associated with pain catastrophizing.

The findings may have practical relevance for non-pharmacological support in migraine. They suggest that psychological counselling and psychoeducation for people with migraine may benefit from considering pain catastrophizing as a clinically relevant psychological process and mindfulness as a potential psychological resource. However, the facet-level results indicate that mindfulness should not be treated as a uniform construct. Future psychoeducational or counselling approaches may place greater emphasis on developing a nonjudgmental attitude toward inner experience, whereas practices focused primarily on observing internal sensations may require careful and individualized adaptation. These findings may also inform the cautious adaptation of mindfulness-based approaches and psychoeducational materials for people with migraine.

AUTHOR NOTE

This article is based on the first author's bachelor thesis "The relationship between mindfulness and pain catastrophizing among patients with migraine", developed at Rīga Stradiņš University in 2026 under the supervision of the second author.

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